In This Issue—*Opening of the Show Season*

MOTOR AGE

Volume XLI
Number 1

PUBLISHED WEEKLY AT THE MALLERS BUILDING
CHICAGO, JANUARY 5, 1922

Thirty-Five Cents a Copy
Three Dollars a Year

Reduced

60¢ to 75¢

The
GENUINE
Champion
BLUE BOX LINE
(except "Heavy" and "Priming" types)
A Type For
Every Engine Everywhere.

THE GOOD OLD GENUINE
Champion X
Ten years Satisfactory
Service in Millions
of Ford
Engines

FOR QUICK TURN-OVER—ASK 'EM TO BUY.

CHAMPION SPARK PLUG CO.
TOLEDO, OHIO

Entered as second class matter Sept. 19, 1899, at the post office at Chicago, Ill., under Act

This prospectus outlines the Thoma sales plan – *write for it*

Another important sales help for dealers who handle the A-L-T SUNBEAM Visor

Merchandise well displayed is half sold — get this plan

THIS handsome Display Stand gives A-L-T Sunbeam Dealers another important sales advantage; it is an exclusive Sunbeam feature. There are three or more Visors, just as they look on a car. Quality built and attractive, finished in a beautiful rich mahogany, with heavy enameled metal signs—a stand that will dress up your window and hold the interest of every motorist who sees it.

The Thoma Sales Plan

The display stand is only one feature of a practical, co-operative selling program that is making quick sales and profits for Sunbeam visor dealers. It is fully described in an interesting sixteen-page Prospectus—write for your copy.

The A-L-T Sunbeam Visor

is sturdy, simple, and of the finest workmanship—handsome enough in design to dress up a $5000 car; low enough in price for the man who must economize. Retails for $16, with a quick, satisfactory profit for the dealer in every sale.

The coupon or a letter will bring you complete details of our liberal dealer proposition. Write.

Thoma & Son, Inc.,
Fairfield, Iowa.

Gentlemen: Please send us copy of your sales Prospectus and details of your dealer proposition on A-L-T Sunbeam Visor. The jobber through whom we buy is.....

.....

.....

.....

Manufactured by THOMA & SON INC. Everything in Glass for the Automobile **Fairfield, Iowa**

MOTOR AGE

Published Every Thursday by

THE CLASS JOURNAL COMPANY

MALLERS BUILDING

59 East Madison Street, CHICAGO

Vol. XLI Chicago, January 5, 1922 No. 1

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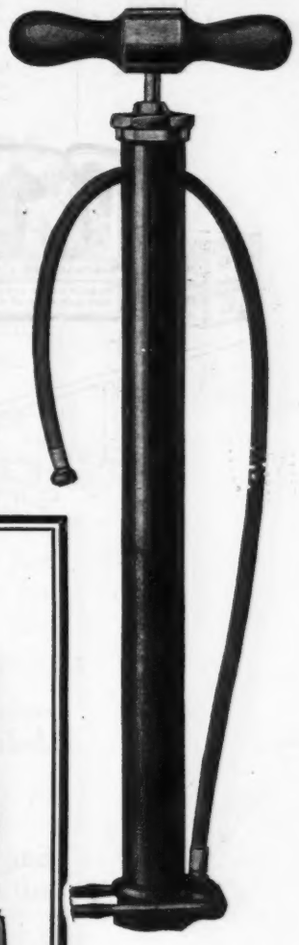
Entered as Second Class Matter Sept. 19, 1899, at the Post Office at Chicago, Ill., under Act of March 6, 1879.

Show Your Customers this MONROE Self-Oiling PUMP

You Won't Have to Ask Them to Buy

Have them operate it. Let them see for themselves how *all* the air is forced into the tire where it belongs. Point out that the valve leather can never dry out—that leakage is positively prevented—that the MONROE *patented* self-oiling washer is found on no other pump—then mention the *low* price at which it sells. You won't have to ask them to buy. They'll pick the MONROE every time.



Every MONROE sale means a *new* customer for your store. For the MONROE never goes back on a user. Regardless of how long it may be out of use, it is ready the instant it's needed.

Let us prove to you what a good-will builder and business booster the MONROE really it. You'll be interested in details and prices.

Monroe Auto Equipment Mfg. Company

Monroe - - Michigan

The Fulton Company
Milwaukee
Sales Representative

Makers also of Monroe Brake Shoes for Fords and Monroe Sedan and Closed Car Spotlight Brackets.

MONROE
Self-Oiling
TIRE PUMP

"I Want a Job in Your Store"

THIS **Milwaukee Timer** Display Stand is all ready to go to work in your store—on the counter or in the window. It is one of the best "silent salesmen" you ever saw. Made of steel, so it will stay put and won't tip over. Handsomely lithographed in five colors. Holds an actual **Milwaukee Timer** and Brush Assembly.

Have you asked for yours yet? It's all ready for you. All you do is ask for it—and give it a chance to sell goods for you.

Drop us a line today and get one—**free,** postpaid. You'll find it sells a lot of timers you might not sell otherwise. While you're waiting on another customer, Mr. Display Stand calls Mr. Fordowner over, shows him the superior quality of the **Milwaukee Timer,** and closes the sale. All you do is accept the money and punch the cash register.

By the way, if your stock of **Milwaukee Timers** is running low, better send an order to your jobber today. It won't be long now until Fords are being groomed for Spring driving, and a good timer is one of the first things a Ford owner wants.

AND **Send for that Counter Stand Today.**

Milwaukee Motor Products, Inc.
(Formerly Milwaukee Auto Engine & Supply Co.)
Milwaukee, Wisconsin

MILWAUKEE TIMER *for* FORDS

Milwaukee Motor Products, Inc. (MA)
Milwaukee, Wis.
Gentlemen:—
Please send me Steel Display Stand, free—postpaid.
Name .....
Address .....
City and State .....
My Jobber is .....

The Publisher's Service Station

Rendering Service to Help You Render Service

The Shows and Specifications

Never before has the editorial staff of MOTOR AGE entered a New Year with as great an editorial program as it has this year.

Months ago these editors decided to devote a considerable portion of their time to gathering and compiling data that would make

The Annual Show Issue and Specification Number

of MOTOR AGE for 1922 the most comprehensive book of its kind.

The editorial staff has made great progress but their work is not yet complete and it will not be until they finish their final drive for additional facts and figures that they insist upon putting into this popular number.

Fortunately, they have ample time to secure the additional information that you need because this important number is scheduled.

to be dated February 2d

after the New York Show, when practically all new cars and models will have been announced and, as a final touch, right in the midst of the Chicago Show.

Next week the editors will give you on this page a list of the more important features to appear in this number.

Several new distinctive features of widest popular appeal from the dealer viewpoint are scheduled.

Watch for this page next week—and bear in mind the date of

The Annual Show Issue and Specification Number—February 2d

Walter Eng. 2-16-1923

NASH
Announces
New Models
New Prices
Effective Now!

NASH SIX PRICES

Five-passenger touring car	$1390
Seven-passenger touring car	1540
Seven-passenger sedan	2390
Four-passenger coupe	2090
Two-passenger roadster	1360
Four-passenger sport model	1545

NASH FOUR PRICES

Five-passenger touring car	$1045
Two-passenger roadster	1025
Three-passenger coupe	1645
Five-passenger sedan	1835
Two-passenger enclosed car	1395

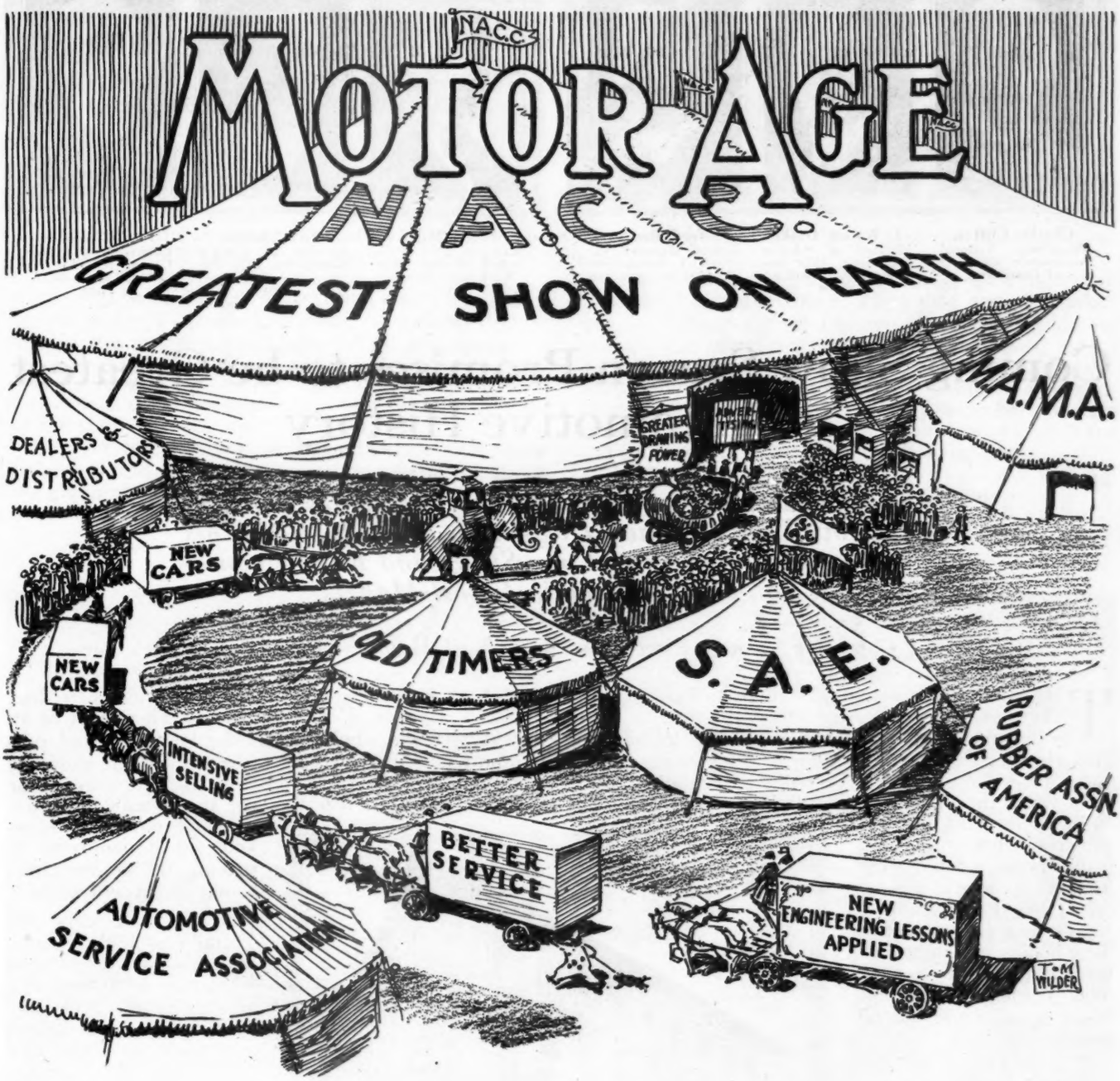
NASH

NASH MOTORS COMPANY, Kenosha, Wisconsin

Nash Leads the World in Motor Car Value

(68)

Vol. XLI. No. 1 Chicago, January 5, 1922 $3 Per Year



The Opening of the Show Season

IN recent years the automotive show has become a feature in the life of many persons that they look forward to with much expectation.

There are two classes of interested spectators at an automotive show:

Those who go to see the new cars with a view to deciding upon which car they will buy, and

Those persons of mechanical interest who go to see the new products to study the improvements.

Both classes are worth while, as they maintain the conversation in social circles that is advertising the motor car everywhere all of the time.

In some communities the dealers have hesitated about putting on a show this year.

TO eliminate the show would be the greatest selling mistake possible. Beginning with the first of the two national shows in New York, the show season should be a recognized event in every section of the country. It would be a success if it served no other purpose than keeping the conversation alive, but it does more than that, IT SELLS CARS.

417995

Charles Clifton
President, National Automobile Chamber of Commerce.

J. Walter Drake
Member of Show Committee, 1922 National Automobile Show

Alfred Reeves
General Manager, National Automobile Chamber of Commerce

S. A. Miles
Manager, 1922 Automobile Shows, New York and Chicago.

H. M. Jewett
Member of Show Committee, 1922 National Automobile Show.

F. C. Chandler
Chairman of Show Committee, 1922 National Automobile Show

Coming Show Season Promises to be Greatest in Automotive History

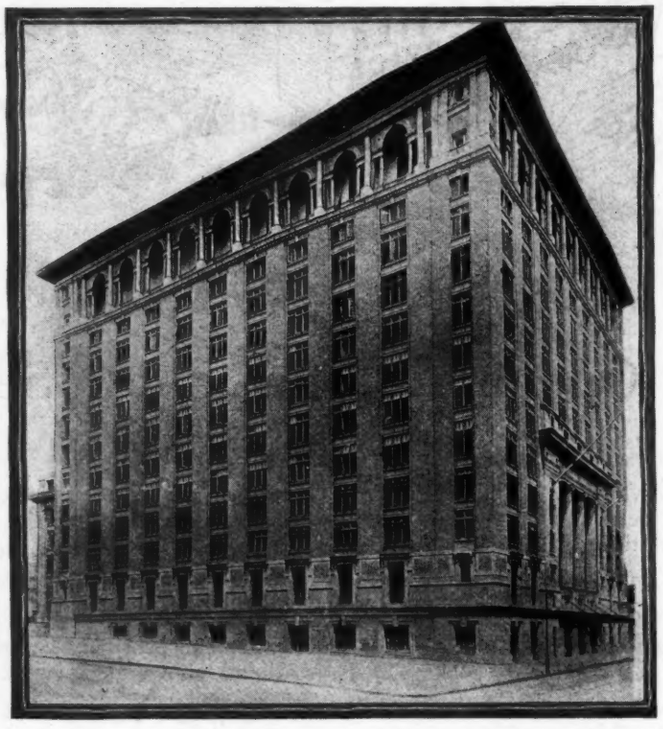
AN Abundance of New Cars, New Bodies and Improved and Refined Designs to Be Exhibited This Year — Results of War-Time Study and Experimentation Incorporated in Latest Models

1922 Show Calendar Largest Ever—Exhibits Will Have Strong Drawing Power

THE automotive industry is about to enter upon a show season which ought to be one of the most interesting and prolific of results in automobile show history. Shows have been held for 22 years, and they have come to be accepted by the public as a time when the new things in design and construction will be brought out for general inspection. There have been some new things in every show year, but 1922 will present a wealth of new cars, new bodies, and improved and refined cars and bodies such as has not been equalled for several years.

The 1922 show will present four cars entirely new to the trade, as well as the public—the Rickenbacker, Durant Six, Jewett (a smaller Paige) and Frontenac. New cars, fairly well known to the trade but new to the great majority of the public, will include the Buick Four, Durant Four, Haynes 75 and Wills Ste. Claire.

Refinements and improvements will be introduced by a large number of makers, notable among them Jordan, Cadillac, Cole, Earl, Essex, Handley-Knight, Chalmers, Chandler, Maxwell, Hudson, Velie and Nash. **There will be an opportunity for wholly truthful advertising and promotion about the new cars to be seen at the shows, a condition which will enable the trade to forget, for the time being, its fear that the shows may lose their drawing power, and devote all its energies to making the shows interesting and worth while.**



Grand Central Palace, where the New York Show will open, Jan. 7, 1922

IN the 1922 cars the trade and the public will see at the shows what may be termed the finished products of war-time study and experimentation in automotive design. The industry learned much as a result of the war experience, particularly in the development of lighter engines and in wonderfully comprehensive tests under all kinds of conditions of the workability and durability of the American cars and trucks.

Since the war ended, engineers and manufacturers have been applying the lessons learned, but until now the automotive buying public has not had the full benefit of this application. After the armis-

tice the factories bowed to the demand for quantity production; experimentation had to stand aside.

When demand fell off in 1920, study along design and construction lines was resumed, and while some new and refined cars were brought out in 1921 and late 1920, it has remained for the 1922 shows to present the full results of the designers' and builders' efforts. It is at the shows of this year that the public will see the after-the-war car in its complete development.

This fact, coupled with the keen need of stimulation in buying, has had much to do with making the 1922 show calendar the largest in the history of the industry.

The New York and Chicago shows, of course, will introduce the season, but far into March and April shows will be held in cities, large and small, in all parts of the country. Dealers in some cities, who decided late in the fall that conditions would not warrant a show in 1922, have changed their minds under the influence of interest in the new cars and the example of other cities which were planning to make the most out of the show opportunity.

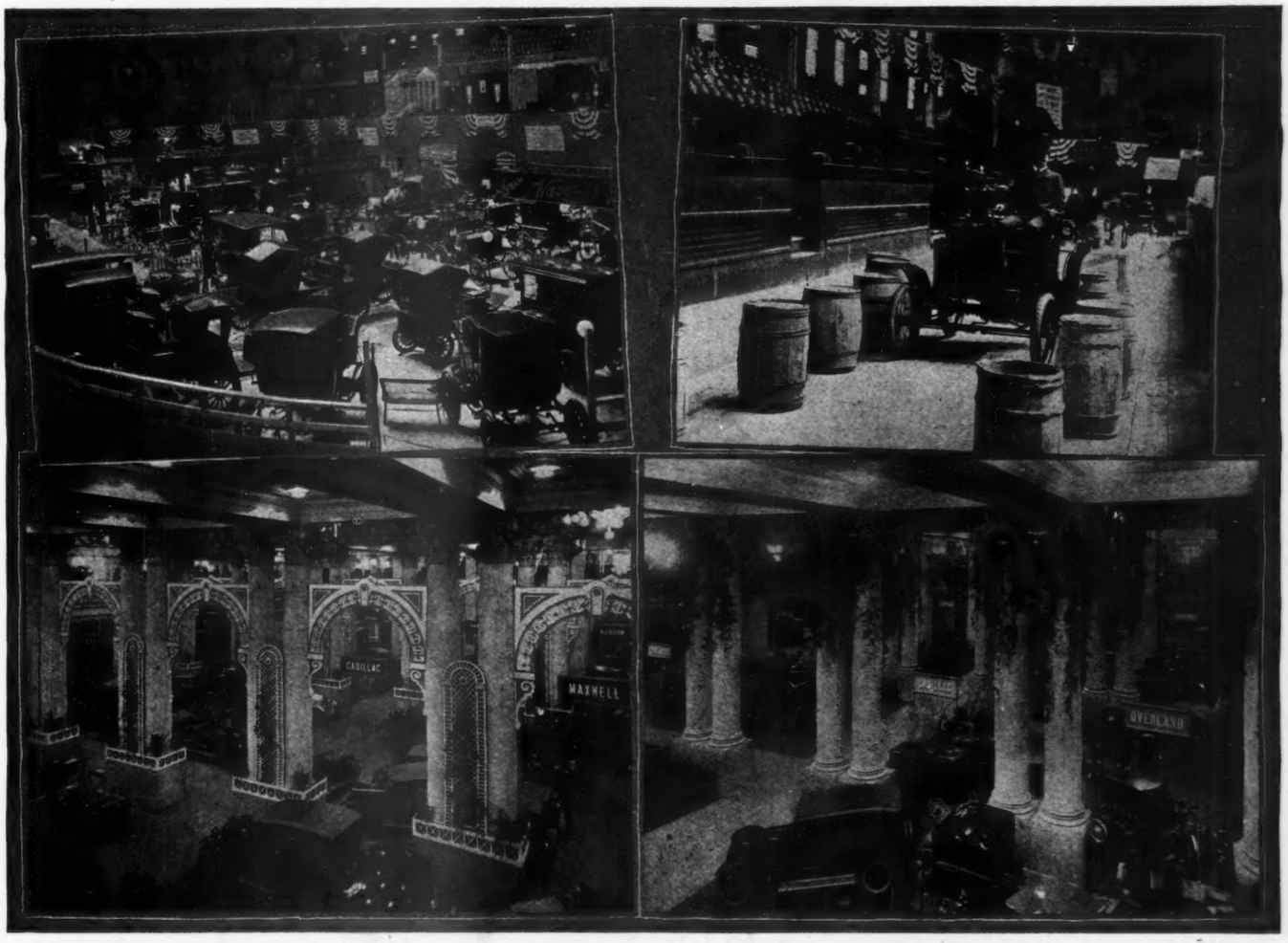
Reports from various sections indicate that show managers and dealer committees in charge of shows are giving more serious thought than ever before to the nature of the exhibits. Every effort will be made not merely to show cars, but to introduce imposing arrays of special bodies, special paint jobs, stripped chassis and cutout chassis as means of drawing the crowds and giving them something to talk about.

An interesting instance of this sort of activity, as applied to smaller city shows, is the plan being carried out by the Michigan Automotive Trade Association, which has arranged a circuit of shows in the towns outside Detroit and which has so scheduled the dates that special exhibits provided by manufacturers and distributors can be moved from show to show and set up in the booths of local dealers representing those lines.

AT the New York show the list of passenger car makers is larger than it was a year ago—91 makes will be shown—and at Chicago there will be almost as many car exhibitors. Automotive equipment exhibitors at the two shows are more numerous than they were last year, and, as usual, large numbers of would-be exhibitors in the accessory field have been unable to obtain space. Passenger car exhibitors at New York and Chicago are listed on the following pages.

Automotive equipment exhibitors at the two national shows are also listed on the pages following.

Thumbing Through the Album of Motor Car Shows
1900—Progress of Transportation—1922



The picture at the upper left is that of the first automobile show. It was held in Madison Square Garden, Nov. 3, 1900. But the public wasn't convinced of the automobile's practical possibilities as it is today, so, as shown at the upper right, a track was built and obstacles were placed on it and the "horseless carriages" were driven around them to prove they could be steered at the will of the driver. Below we have the shows of later years. Here Mr. and Mrs. Car Owner come every year to view the latest offerings in de luxe transportation in an atmosphere of dignity and splendor and to have instilled into their breasts a burning desire to own one of these triumphs of engineering and coachbuilding skill

The New York Automobile Show at a Glance

Opening Date—Saturday, January 7, at 2 p. m.
Opening—Daily thereafter, except Sunday, from 10:30 a. m. to 10:30 p. m., until Saturday, January 14, inclusive.
Auspices of National Automobile Chamber of Commerce
Location—Grand Central Palace, Lexington Avenue, 46th to 47th Streets. Four lower floors.
How to get there—Lexington Avenue Subway to 42nd St., or 7th Ave. Subway to Times Square and Shuttle to Grand Central Station; or Third Ave. Elevated to 47th St.; or the following surface lines: 42nd St., Madison Ave., Lexington Ave., Third Ave.
Number of exhibitors of passenger cars—92.
Number of makes shown for first time..12.
Number of exhibitors of accessories—250.
Manager—S. A. Miles.
Show Committee—H. M. Jewett, Paige Detroit Motor Car Company, Chairman.
J. Walter Drake, Hupp Motor Car Co.
F. C. Chandler, Chandler Motor Car Co.
Highest Priced Car—$11,000.
Lowest Priced Car—$525.

Passenger Car Exhibitors at the New York and Chicago National Shows—Number Exceeds Last Year

Company	Address	Car	N.Y.	Chi.
Anderson Motor Co., Rock Hill, S. C.		Anderson	x	x
Apperson Bros. Auto Co., Kokomo, Ind.		Apperson	x	x
Auburn Auto Co., Auburn, Ind.		Auburn	x	x
Barley Motor Car Co., Kalamazoo, Mich.		Roamer	x	x
Bournonville Rotary Valve Motor Co.,	Hoboken, N. J.	Rotary Six	x	
Earl Motor Corp., Inc., Jackson, Mich.		Earl	x	x
Buick Motor Co., Flint, Mich.		Buick	x	x
Cadillac Motor Car Co., Detroit, Mich.		Cadillac	x	x
Cortland Cart & Cge. Co., Sidney, N. Y.		Hatfield	x	
J. I. Case T M. Co, Racine, Wis.		Case	x	x
Chalmers Motor Car Co, Detroit, Mich.		Chalmers	x	x
Chandler Motor Car Co., Cleveland, Ohio		Chandler	x	x
Chevrolet Motor Co., Detroit, Mich.		Chevrolet	x	x
Cleveland Auto. Co., Cleveland, Ohio		Cleveland	x	x
Cole Motor Car Co., Indianapolis, Ind.		Cole	x	x
Columbia Motors Co., Detroit, Mich.		Columbia	x	x
Commonwealth Motors Co., Chicago, Ill.		Goodspeed	x	x
Crow-Elkhart Motor Corp., Elkhart, Ind.		Crow-Elkhart	x	x
Geo. W. Davis Motor Car Co., Richmond, Ind.		Davis	x	x
Detroit Elec. Car Co., Detroit, Mich.		Detroit-Electric	x	x
Dodge Bros., Detroit, Mich.		Dodge Bros.	x	x
Dorris Motor Car Co., St. Louis		Dorris	x	x
Dort Motor Car Co., Flint, Mich.		Dort	x	x
duPont Motors, Inc., Wilmington, Del.		duPont	x	
Durant Motor Co. of N. Y., Inc.,	Long Island City	Durant	x	x
Elgin Motor Car Corp., Argo, Ill.		Elgin	x	x
Elkhart Carriage & Motor Car Co.,	Elkhart, Ind.	Elcar	x	x
Essex Motors, Detroit, Mich.		Essex	x	
H. H. Franklin Mfg. Co., Syracuse, N. Y.		Franklin	x	x
Gardner Motor Co., Inc., St. Louis, Mo.		Gardner	x	x
Grant Motor Car Corp., Cleveland, Ohio		Grant	x	x
H. C. S. Motor Car Co., Indianapolis, Ind.		H. C. S.	x	x
Handley-Knight Co., Kalamazoo, Mich.		Handley-Knight	x	x
Hanson Motor Co., Atlanta, Ga.		Hanson	x	x
Haynes Auto Co., Kokomo, Ind.		Haynes	x	x
Holmes Auto Co., Canton, Ohio		Holmes	x	x
Hudson Motor Car Co., Detroit, Mich.		Hudson	x	x
Hupp Motor Car Corp., Detroit, Mich.		Hupmobile	x	x
Itala Fabbrica Automobili, Torino, Italy		Itala	x	
Jackson Motors Corp., Jackson, Mich.		Jackson		x
Jordan Motor Car Co., Cleveland, Ohio		Jordan	x	x
Kelsey Motor Co., Newark, N. J.		Kelsey	x	
Kentucky Wagon Mfg. Co., Louisville, Ky.		Dixie Flyer	x	x
King Motor Car Co., Detroit, Mich.		King	x	x
Kissel Motor Car Co., Hartford, Wis.		Kissel	x	x
Kline Car Corp., Richmond, Ind.		Kline Kar	x	

Company	Address	Car	N.Y.	Chi.
Lafayette Motors Co., Indianapolis, Ind.		Lafayette	x	x
Leach-Biltwell Motor Car Co.,	Los Angeles, Cal.	Leach	x	
Lexington Motor Co., Connersville, Ind.		Lexington	x	x
Liberty Motor Car Co., Detroit, Mich.		Liberty	x	x
Lincoln Motor Co., Detroit, Mich.		Lincoln	x	x
Locomobile Co., Bridgeport, Conn.		Locomobile	x	x
McFarlan Motor Corp., Connersville, Ind.		McFarlan	x	x
Maibohm Motors Co., Sandusky, Ohio		Maibohm	x	x
Maxwell Motor Corp., Detroit, Mich.		Maxwell	x	x
Mercer Motors Co., Trenton, N. J.		Mercer	x	x
Milburn Wagon Co., Toledo, Ohio		Milburn Electric	x	x
Mitchell Motors Co., Inc., Racine, Wis.		Mitchell	x	x
Moon Motor Car Co., St. Louis, Mo.		Moon	x	x
Nash Motors Co., Kenosha, Wis.		Nash	x	x
National Motor Car & Veh. Corp.,	Indianapolis, Ind.	National	x	x
Noma Motor Corp., New York City		Noma	x	
Nordyke & Marmon Co., Indianapolis, Ind.		Marmon	x	x
Oakland Motor Car Co., Pontiac, Mich.		Oakland	x	x
Olds Motor Works, Lansing Mich.		Oldsmobile	x	x
Packard Motor Car Co., Detroit, Mich.		Packard	x	x
Paige-Detroit Motor Car Co., Detroit, Mich.		Paige	x	x
W. A. Paterson Co., Flint, Mich.		Paterson	x	x
Peerless Motor Car Co., Cleveland, Ohio		Peerless	x	x
Pierce-Arrow Motor Car Co., Buffalo, N. Y.		Pierce-Arrow	x	x
Pilot Motor Car Co., Richmond, Ind.		Pilot	x	x
Premier Motor Corp., Indianapolis, Ind.		Premier	x	x
R. & V. Motor Co., East Moline, Ill.		R. & V. Knight	x	x
Rauch & Lang, Inc., Chicopee Falls, Mass.		Rauch-Lang	x	x
Reo Motor Car Co., Lansing, Mich.		Reo	x	x
Rickenbacker Motor Co., Detroit, Mich.		Rickenbacker	x	
Saxon Motor Car Corp., Detroit, Mich.		Saxon	x	x
Sayers & Scoville Co., Cincinnati, Ohio		Sayers	x	x
Standard Steel Car Co., Pittsburgh, Pa.		Standard	x	x
Stanley Motor Carriage Co., Newton, Mass.		Stanley	x	x
F. B. Stearns Co., Cleveland, Ohio		Stearns	x	x
Stephens Motor Works, Freeport, Ill.		Stephens	x	x
Stevens-Duryea, Inc., Chicopee Falls, Mass.		Stevens-Duryea	x	x
Studebaker Corp., South Bend, Ind.		Studebaker	x	x
Stutz Motor Car Co. of America, Inc.,	Indianapolis, Ind.	Stutz	x	x
Templar Motors Co., Cleveland, Ohio		Templar	x	x
Vauxhall Motor, Ltd., Toronto, Canada		Vauxhall	x	
Velie Motors Corp., Moline, Ill.		Velie	x	x
Westcott Motor Car Co., Springfield, Ohio		Westcott	x	x
O. H. Wills & Co., Marysville, Mich.		Wills St. Clair	x	x
Willys-Overland, Inc., Toledo, Ohio		Overland and Willys-Knight	x	x
Yellow Cab Mfg. Co., Chicago, Ill.		Ambassador	x	

Equipment Makers Demand for Shows Space Exceeds Any Previous Exhibits

Following Are Listed the Firms to Which Space Has Been Allotted:

Company	Address	N.Y.	Chi.
Able Mfg. Co., Inc., San Francisco		x	x
Acme Die Casting Corp., Brooklyn		x	
Acme Motor Shield Corp., New York		x	x
Akkurate Loose Leaf Co., Inc., N. Y.		x	
Alexander Mirrorscope Co., New York		x	x
Ambroleum Co., London, England		x	
American Auto Lamp Co., Inc., N. Y.		x	
Am. Chain Co., Inc., Bridgeport, Conn		x	x
Am. Drop Forging Inst., Cleveland			x
American Pump & Tank Co., N. Y.		x	
American Steel Foundries, Chicago		x	x
American Taximeter Co., New York			x
Am. Wood Rim Co., Onaway, Mich.		x	x
Anchor Top & Body Co., Cincinnati		x	x
Apex Elec. Mfg. Co., Chicago		x	

Company	Address	N.Y.	Chi.
Arkay Sales Co., New York		x	
Arrow-Grip Mfg. Co., Inc.,	Glens Falls, N. Y.	x	x
Asch & Co., Inc., New York		x	x
Atlas Crucible Steel Co., Dunkirk, N. Y.		x	x
Auto Bed Camp Mfg. Co., N. Y		x	x
Auto Pedal Pad Co., Inc., New York		x	
Automobile Journal Publ. Co.,	Pawtucket, R. I.	x	x
Automotive Gear Works, Atlanta, Ga.		x	x
Automotive Parts Mfg. Co., New York		x	
B. G. Corp., New York		x	x
Badger Mfg. Corp., Milwaukee, Wis.			x
Alfred E. Baker & Co., Chicago			x
Barnes Foundry Co., Jersey City		x	

Company	Address	N.Y.	Chi.
Wallace Barnes Co., Bristol, Conn.		x	
Bassick Mfg. Co., Chicago		x	x
Becker Bros., Chicago		x	x
Beneke & Kropf Mfg. Co., Chicago		x	x
Benzer Corp., Brooklyn, N. Y.		x	
Biflex Products Co., Waukegan, Ill.		x	x
Blackledge Mfg. Co., Chicago		x	x
Blue Ribbon Body Co., Bridgeport		x	
A. Boyriven, New York		x	
Bridgeport Coach Lace Co., Bridgep't		x	x
J. D. Bridges Co., Florence, S. C.		x	
Brown-Lipe Gear Co., Syracuse, N. Y.		x	x
Buda Co., Harvey, Ill.			x
Edward G. Budd Mfg. Co., Phila., Pa.		x	
Budd Wheel Corp., Philadelphia		x	x

Company	Address	N.Y.	Chi.
Buell Mfg. Co., Chicago			x
Bunnell & Co., Chicago			x
Burpee-Johnson Co., Indianapolis		x	x
Byrne, Kingston & Co., Kokomo, Ind.		x	x
C. G. Spring Co., Kalamazoo, Mich.		x	x
A. S. Campbell Co., E. Boston, Mass.			x
Carr Fastener Co.,	Cambridge, 39, Mass.	x	x
Carrm Auto Body Co., New York		x	
Casey Hudson Co., Chicago		x	x
Champion Ignition Co., Flint, Mich.		x	x
Champion Mfg. Co., Chicago			x
Champion Pneu. Mach. Co., Chicago		x	x
Chicago Tool & Kit Mfg. Co., Chicago			x
Chilton Co., Philadelphia		x	x
Clark Equip. Co., Buchanan, Mich.		x	x
Clark-Turner Piston Co., Los Angeles		x	x
Class Journal Co., New York		x	x
Coffield-Tire Protector Co., New York		x	
Collins Puncture Proof Tube Co.,	Hackensack, N. J.	x	x
Columbia Axle Co., Cleveland			x
K. S. Conrad Co., Inc., Greenville, S. C.		x	x
Continental Motors Corp., E. Detroit		x	x
C. Cowles & Co., New Haven, Conn.		x	x
Cox Brass Mfg. Co., Albany, N. Y.		x	x
C. de L. Engineering Works, N. Y.		x	
Damon Mfg. Co., Chicago			x
Dayton Steel Foundry Co., Dayton		x	x
A. J. Detlaff Co., Detroit			x
Detroit Pressed Steel Co., Detroit		x	x
Doehler Die Casting Co., Brooklyn		x	x
Double Safety Signal Co., Chicago			x
Double Seal Ring Co., New York		x	x
Doughty Mfg. Co., New York		x	
Dura Mechanical Hdw. Co., Toledo		x	x
E. A. Laboratories, Inc., Brooklyn		x	x
Eberhard Mfg. Co., Cleveland		x	x
Eclipse Machine Co., Elmira, N. Y.		x	x
Elgin Rubber Ace Co., Elgin, Ill.			x
English & Mersick Co., New Haven		x	
L. B. Edwin Co., Chicago			x
Eureka Auto Lock Co., Chicago			x
Fan Flame Spark Plug Co., Inc.,	Yonkers, N. Y.	x	
Wm. M. Farans, New York		x	
J. H. Faw Co., New York		x	
Ferguson Publishing Co., New York		x	x
Fire Gun Mfg. Co., Inc., New York		x	
Ferodo, care Alfred & Co., New York		x	
Fisher-Sweeney Bronze Co.,	Hoboken, N. J.	x	x
Folberth Auto Spec. Co., Cleveland		x	x
Forshay Bros., New York		x	
Fracto, Inc., Boston		x	x
Fulton Co., Knoxville, Tenn.		x	x
Gabriel Mfg. Co., Cleveland		x	x
Gahm-McCormick Co., Streator, Ill.			x
Gates Mfg. Co., Indianapolis		x	x
General Elec. Co., Schenectady, N. Y.		x	x
General Safety Signal Co., New York		x	
Gerke Sales Co, New York		x	
Giant Grip Mfg. Co., Oshkosh, Wis.		x	x
Gill Mfg. Co., Chicago		x	x
Globe Mfg. Co., Battle Creek, Mich.			x
Grand Rapids Brass Co., Gd. Rapids		x	
Graynic Corp., Chicago			x
Guarantee Liquid Measure Co.,	Rochester, Pa.	x	x
C. M. Hall Lamp Co., Kenosha, Wis.			x
L. P. Halladay Co., Decatur, Ill.			x
Hartford Automotive Parts Co.,	Hartford, Conn.	x	x
Hartford Battery Mfg. Co.,	Millidale, Conn.	x	x
Edward V. Hartford, Inc., New York		x	x
Hartland Co., New York		x	x
Harvey Rim & Wheel Co., Buffalo		x	x
Robert H. Hassler, Inc., Indianapolis		x	x
Hayes Mfg. Co., Detroit		x	x
Heald Machine Co., Worcester, Mass.		x	x
R. M. Hollingshead Co., Camden, N. J.		x	x
Ernest Holmes Co., Chattanooga			x
Geo. L. Holmes, New York		x	
Holophane Glass Co., Inc., New York		x	
Houdaille Co., Buffalo		x	x
Houpert Machine Co., L. I. City		x	
Imperial Brass Mfg. Co., Chicago			x
Jefferson Forge Products Co., Detroit		x	x
Jon-Con Tire Protector Co., Phila.		x	
Johnson Auto. Lock Co., Chicago		x	x
K-W Ignition Co., Cleveland		x	x
Kant-Rust Products Corp.	Rahway, N. J.	x	x
Kant-Skore Piston Co., Cincinnati		x	x
I. Kellerman, New York		x	x
Kelso Mfg. Co., Trenton, N. J.		x	
Atwater Kent Mfg. Co., Philadelphia		x	
Kokomo Electric Co., Kokomo, Ind.		x	x
Kollmorgen Optical Corp., Brooklyn		x	
Kraeuter & Co., Inc., Newark		x	x
La-La Chemical Co., Inc., Providence		x	
Landis Tool Co., Waynesboro, Pa.		x	x
Lane Bros. Co., Poughkeepsie, N. Y.		x	x
Geo. E. La Vietes Co., New Haven		x	
L. Lawrence & Co., Newark		x	x
Geo. W. LeCompte Co., Newark		x	
Light Mfg. & Fdy. Co., Pottstown, Pa.		x	
Link Belt Co., Indianapolis		x	x
David Lupton's Sons Co., Philadelphia			x
Lyons Level & Tool Co., New Haven		x	
McQuay-Norris Mfg. Co., St. Louis		x	x
Macbeth-Evans Glass Co., New York		x	x
John L. Madsen, New York		x	
Manley Mfg. Co., York, Pa.		x	x
Paul M. Marko & Co., Brooklyn		x	
Marquette Mfg. Co., St. Paul, Minn		x	x
Martin Motor Co., Springfield, Mass.		x	
S. W. Merritt Co., Inc., New York		x	
Metal Stamping Co., L. I. City		x	x
Michigan State Auto School, Detroit			x
Midwest Engine Co., Indianapolis		x	x
Miller Auto Supply Co., New York		x	
Millers Falls Co., New York		x	
Milwaukee Tank Works, Milwaukee		x	x
Monarch Metal Prod. Co., St. Louis			x
Stephen V. Morrin, New York		x	
Morse Chain Co., Ithaca, N. Y.		x	
Moto-Meter Co., Long Island City		x	x
Motor, New York		x	
Motor Vehicle Publishing Co., N. Y.		x	x
Mullins Body Corp., Salem, Ohio		x	
Naperville Machine Co., Inc.,	Naperville, Ill.		x
National Carbon Co., Cleveland		x	x
National Seal Co., Brooklyn		x	x
Ner-a-Car Corp., Syracuse, N. Y.			x
New York Coil Co., New York		x	x
Noble Piano Co., Detroit, Mich.		x	x
No-Leak-O Piston Ring Co., Baltimore		x	x
Norton Co., Worcester, Mass.		x	x
P. & F. Auto Supply Co., Inc., N. Y.		x	
Packard Engineering Co., Cleveland		x	x
Pantasote Co., New York		x	x
Parko Mfg. Co., Inc., Rochester, N. Y.		x	x
Perfection Heater & Mf. Co., Cleveland		x	x
Phila. Storage Battery Co., Phila.		x	x
Philbrin Corp., Kennett Sq., Pa.		x	
Pines Mfg. Co., Chicago			x
Porter Elec. Carburetor, Inc., N. Y.		x	x
Wm. E. Pratt Mfg. Co., Chicago		x	x
Preferred Utilities Co., Inc., N. Y.		x	
Pro-Mo-Tor Fabricating Corp., N. Y.		x	
Protex Signal Co., Cleveland		x	x
W. E. Pruden Hardware Co., N. Y.		x	
Pyrene Mfg. Co., Inc., New York		x	
Rajo Motor Co., Racine, Wis.			x
Record Accessories Corp., Philadelphia			x
Recording Devices Co., Dayton, Ohio		x	x
Rees Mfg. Co., Pittsburgh, Pa.		x	x
Rex Mfg. Co., Connersville, Ind.		x	x
Rimtco Lubricator Co., Inc., Boston		x	
Geo. H. Rives Mfg. Co., Inc., Brooklyn		x	
Ryser Machine Works, Chicago			x
Safetee Glass Co., Philadelphia		x	x
Safstrom Mfg. Co., Chicago		x	x
Shaap Co., Brooklyn		x	
A. Schraders Son, Inc., Brooklyn		x	x
Sedgwick Sales Co., New York		x	x
Self Seating Valve Co., Chicago		x	x
Sewell Cushion Wheel Co., Detroit		x	x
H. B. Shontz Co., Inc., New York		x	
H. A. Shunk, Inc., New York		x	
Simplex Corp., Chicago		x	x
Sinclair Militor Corp., New York		x	
Fred A. Smith, New Rochelle, N. Y.		x	
Jos. N. Smith & Co., Detroit		x	x
F. L. Smith Machine Co., New York		x	x
South Bend Lathe Works, South Bend		x	x
Sparks-Withington Co.,	Jackson, Mich.	x	x
Splitdorf Electrical Co., Newark		x	x
Standard Auto Parts Co. of America,	Newark, N. J.	x	x
John T. Stanley Co., Inc., New York		x	
Steel Spring Piston Ring Co., Brooklyn		x	x
Stewart-Warner Speedometer Corp.,	Chicago	x	x
Stokes Engineering Co., Inc.,	Good Ground, L. I.	x	
Stromberg Motor Devices Co., Chicago		x	x
Sun Co., Philadelphia		x	x
Sunderman Corp., Newburg, N. Y.		x	x
Superior Lamp Mfg. Co., New York		x	
Tanners' Council of the U. S. A.,	Upholstery Div., New York	x	x
Timken-Detroit Axle Co., Detroit		x	x
Tonneau Shield Co., New York		x	x
Trexler Co., Philadelphia		x	x
Trindl Co., Chicago			x
Triple Action Spring Co. of N. Y., Inc.,	New York	x	
U. S. Axle Co., Pottstown, Pa.		x	
U. S. Compression Inner Tube Co.,	Tulsa, Okla.	x	x
U. S. E. Corp., New York		x	
Utica Compressor Co., Inc., Utica, N. Y.		x	
Vacuum Oil Co, New York		x	x
Van Kerr Co., New York		x	x
Veeder Mfg. Co., Hartford, Conn.		x	x
Vibration Specialty Co., Philadelphia		x	x
Viktry Mfg. Co., Milwaukee		x	x
Walker Mfg. Co., Racine, Wis.			x
Waltham Watch Co., Waltham, Mass.		x	x
Warner Patterson Co., Chicago		x	x
Waukesha Motor Co., Waukesha, Wis.		x	x
Weaver Mfg. Co., Springfield, Ill.		x	
Joseph Weidenhoff, Chicago			x
Wellley Motors Co., Indianapolis			x
Weldo Patch Mfg. Co., New York		x	
Wellman-Seaver-Morgan Co.,	Akron, Ohio	x	
Westinghouse Lamp Co., New York			x
Weston Elec. Instrument Co., Newark		x	
Wheeler-Schebler Carburetor Co.,	Indianapolis	x	x
White Products Co., Chicago			x
S. S. White Dental Mfg. Co., N. Y.			x
Whitney Mfg. Co., Hartford, Conn		x	
Wildenberg Bros., New York		x	
K. R. Wilson, Buffalo		x	x
Winterknight Equipment Co., Phila.		x	x
Wire Wheel Corp. of America, Buffalo		x	x
Wisconsin Top Co., Inc., Racine, Wis.		x	
Witherbee Storage Battery Co., Inc.,	New York	x	
F. Walkow & Sons, Louisville, Ky.			x
World Metal Products Corp.,	Richmond Hill, N. Y.	x	
Wyman-Gordon Co., Worcester, Mass.		x	
Zenith Carburetor Co., Detroit			x
B. F. Zimmerman Mfg. Co., Inc.,	New Haven, Conn.	x	x

Schedule of Events for Automobile Show Week

MONDAY, Jan. 9:

Annual meeting Rubber Association of America, Waldorf-Astoria, 2:30 P. M.

Divisional meetings Rubber Association, Yale Club.

Opening Body Builders' Show, Twelfth Regiment Armory, Columbus Ave. and 62nd St.

Opening automotive accessories show of National Retail Merchants' and Buyers' Association, Hotel Imperial.

Dinner of Rubber Association, Waldorf-Astoria, 7 P. M.

Dinner of Aero Club of America, Commodore, 7:30 P. M.

Dinner of Old Timers' Association, Flotilla Restaurant, Sixth Ave. and 56th St.

TUESDAY, Jan. 10:

Annual convention export managers, National Automobile Chamber of Commerce, at N. A. C. C. headquarters.

Annual meeting, Society of Automotive Engineers, Engineering Building.

Dinner of N. A. C. C., Commodore, 7 P. M.

WEDNESDAY, Jan. 11:

Annual meeting of Motor and Accessory Manufacturers' Assn., Commodore, 2:30 P. M.

Monthly meeting directors of N. A. C. C. at 10 A. M.

Luncheon of National Association of Show Managers at Woodstock Hotel, at noon.

Dinner of M. A. M. A. at Commodore, 7 P. M.

THURSDAY, Jan. 12:

Annual dinner of S. A. E. at Hotel Astor, 7 P. M.

Paige-Detroit Motor Car Co. dinner at Commodore, 7:30 P. M., to unveil new Jewett car.

FRIDAY, Jan. 13:

Dinner and convention of Automobile Service Associations at Automobile Dealers' Club, 6:30 P. M.

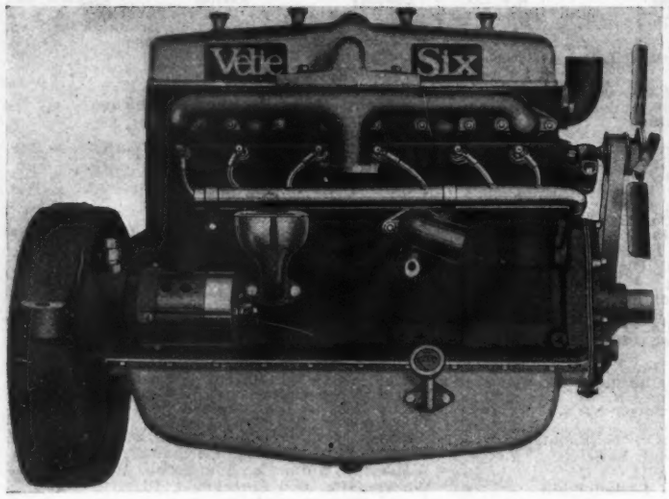


Fig. 1—Exhaust side of Velie-built engine, showing starter mounting and generous sized oil filler

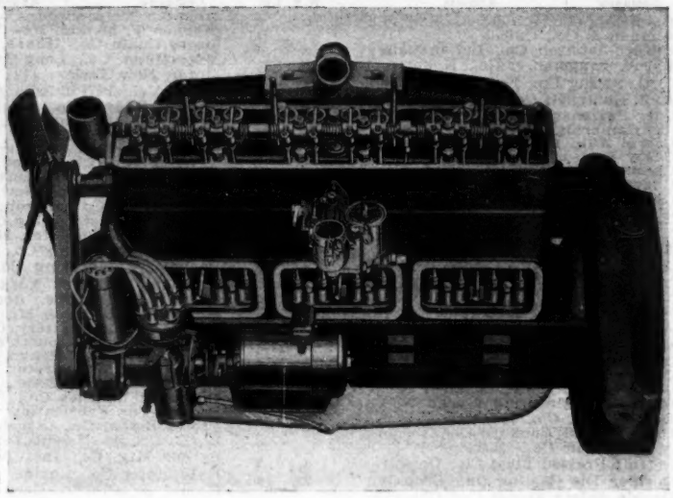


Fig. 2—Inlet side of Velie-built engine, with valve covers removed. Generator may be removed without disturbing ignition unit

Clean Engine Design and Accessibility Dominant in New Velie

Starter, Generator, Fan or Valve Mechanism Readily Removed Without Disturbing Adjacent Units—Clutch Adjustment Easily Made—Hot Spot an Integral Part of Cylinder Head

By P. L. DUMAS

EXTENSIVE research work on the present-day problems of fuel vaporization have led to the development of the inherent hot-spot used on the new series Velie cars. The gas passages are cored into the removable cylinder head, of which the hot-spot vaporizer is an integral part. The power plant layout shows that special emphasis was given to the items of lubrication, accessibility and the reduction of unnecessary weight. The new series supersedes all previous models. This chassis, which will be the only one produced by Velie, is known as model 58. A detailed description of the mechanical features follows:

Accessories Easy to Remove

The engine accessory drive is unusually well worked out. The generator can be removed without disturbing the ignition unit, or vice versa. The intake side of the engine is shown in Fig. 2. The exhaust side presents a trim appearance; a breather and filling spout of unusual size is mounted on the crankcase on this side. The starter is readily removable by loosening the retaining screw and locknut. Among the engine accessories are found Atwater-Kent ignition, Bijur two-unit six-volt starting and lighting, and either a Zenith or Stromberg carbureter. The amount of oil in the oil-pan, which has a capacity of 5 qts., is indicated by a gage on the exhaust side of the engine. S A. E. standards have been followed throughout the construction of engine and chassis. The flywheel is machined to accommodate the Dooley or Borg & Beck clutch.

A sectional view of the Dooley clutch is shown in Fig. 3. This is a Velie product and is novel in two respects: first, the method of adjustment, which is accomplished without the aid of tools.

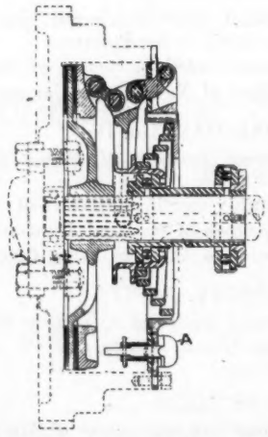


Fig. 3—Clutch assembly with adjusting wing nut at "A." Thrust plate actuating toggles shown in upper portion of illustration

The thumb nut shown at "A" in the drawing is movable and is positioned by notches on the clutch housing, which provides the same effect as a notched throttle quadrant. It is only necessary to pull the thumb nut up and over one notch to secure the necessary adjustment. The entire operating mechanism is carried on the clutch housing.

The second feature is the method of securing the clutch driving or thrust-plate. The usual practice in single plate clutches is to have this member driven by dowels fastened to the flywheel. A clever system of toggles provides for positive withdrawal of the clutch plate from the friction plate when declutching.

A Durston three-speed transmission is bolted to the housing behind the clutch. The main shaft is mounted on annular ball bearings and the countershaft is carried on plain bearings.

Frame Made by Velie

The power plant is suspended at three points. The maximum speed of the engine is 3100 r.p.m.; maximum power, which is 45 hp., is obtained at 2500 r.p.m.; the maximum torque is 115 foot pounds.

The frame is manufactured in the Velie shops. Semi-elliptic springs are fitted front and rear. The purchaser has the option of wood or disk wheels. The tire equipment is Miller cords, 32 by 4

in., nonskid all around. The rear axle is the latest model Timken, semi-floating. The pinion shaft is fitted with two bearings, one in front of the pinion and the other at the rear. This rear bearing insures a very rigid pinion shaft.

Brakes are on the rear wheels. The hand brake is internal expanding and the foot brake external contracting.

Engine Details

Cooling is by thermo-syphon, with water surrounding all cylinders. The bore of 3½ in. and stroke of 4¼ in. give a total piston displacement of 195.6 in. and an N. A. C. C. rating of 23.4 hp.; timing gears, 12 face, nine pitch helically cut; camshaft gear is of Micarta. Full pressure lubrication is employed, and is effected by the gear pump mounted on the generator driveshaft housing, which draws oil through a strainer from the oil pan in the crankcase.

The oil from the discharge side of the pump is conducted by piping to the distributor pipe opening shown at "vs. 180" on the sectional drawing. This pipe leads the oil to each main bearing. The drilled crank cheeks provide a path for the lubricant to the connecting rod bronze backed bearings. The upper half connecting rod bushing is drilled to receive a small copper tube leading to the wrist pin and clipped to the side of the rod. This tube receives oil under pressure from the hollow crankshaft.

The oil distributing line is provided with a Tee at the third main bearing, which has a branch leading to the hollow rocker arm shaft. The seepage from this shaft runs down the rocker arms in sufficient quantities to lubricate the valve pushrods, and, as it continues down the pushrod, the valve lifters are thoroughly lubricated. The remainder of the overflow runs down the side of the cylinder and is caught in the shallow tray in the valve lifter chamber.

Oil ducts drilled in the casting carry this oil to each of the four camshaft bearings. An oil pressure relief adjusting valve is located on the outside of the crankcase at the front right-hand corner. The oil allowed to escape by this relief is discharged directly onto the crankshaft gear and thrown over the the other gears, a portion of it being caught in a pocket over the generator driveshaft bearings and fed into these bearings by suitable passages.

The crankshaft is drop forged from S. A. E. No. 1045, 40-50 carbon steel, suitably heat-treated. The camshaft is made from S. A. E. No. 1020, 15-25 carbon steel, case hardened on the cams and bearing surfaces.

Large Bearing Area

Camshaft and generator shaft bearings are die cast babbitt. There are four crankshaft bearings of two-inch diameter and lengths from front to back as follows: 2¼, 2½, 2¾. The camshaft is 1⅛ in. in diameter and has bearings of unusual size. No. 1 is 1 5/16 in. in diameter by 2 9/32 in. in length; No. 2, 1 29/32 in. by 1 in. long; No. 3, 1⅝ in. by 1 in. long; No. 4, 27/32 in. by 1¾ in. long.

It is the claim of the makers that the engine has a greater bearing area than any engine of equal piston displacement. The connecting rods measure 8⅜ in. center to center. Connecting rod bearings are fastened into place and then expanded and completely fill the rod ends and caps. The bearings are then broached after they are united together and finally run in under tension. The length of these bearings is 1⅝ in., with a diameter of two inches.

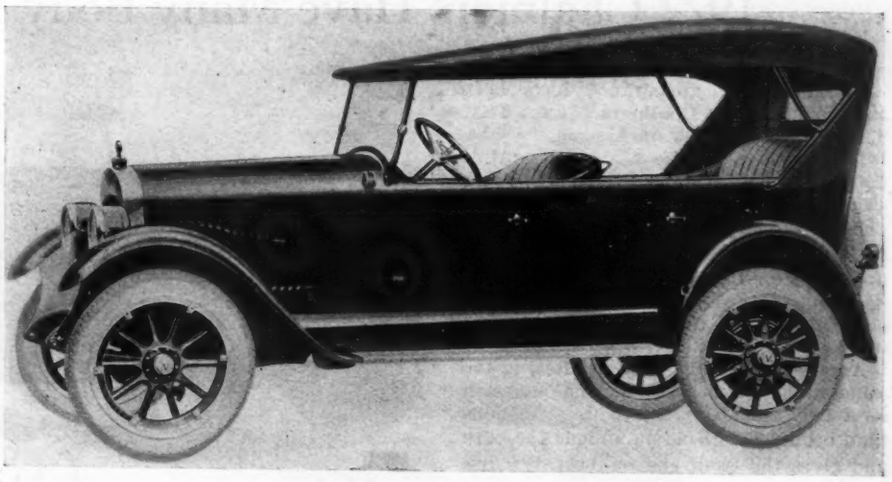
The cast iron pistons are unusually light and are provided with three piston rings, all above the piston pin. The pistons are 3½ in. in length and are fitted with .001 in. clearance for each inch of cylinder diameter. The cylinder block, which represents a good example of thorough water jacketing, is shown in the longitudinal cross section engine view. The water jackets completely surround each cylinder, as well as the valve seats. The block is first rough bored and then set aside for a time to season. A second boring operation is performed and then the bores are accurately ground to size.

The piston pins of .740 in. diameter are held in the piston boss by a set screw passing entirely through the piston pin and opposite wall of the piston boss. The rings are of cast iron 3/16 in. in width.

Valve Grinding Simplified

The removable cylinder head is held down by 13 cap screws. The rocker shaft is anchored to the head independent of the cylinder head cap screws and is removed as a unit with the head. The time of the service operation of grinding the valves is considerably lessened by this construction. The cored gas and water passages are clearly shown in the section of the cylinder head in Fig. 6.

The valve port size is 1 5/16 in. The valve stem guides are 3¼ in. long and are reamed by hand to accommodate the 5/16 in. valve stems. The valve lifters



Five-passenger touring body on new Velie chassis

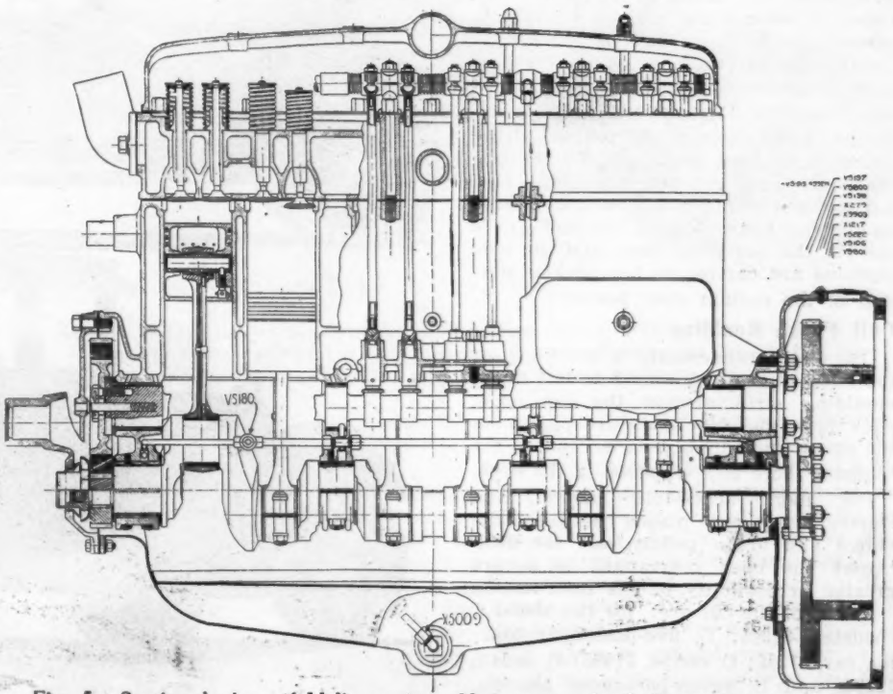


Fig. 5—Sectional view of Velie engine. Note external oil distribution pipe and large sized water passages

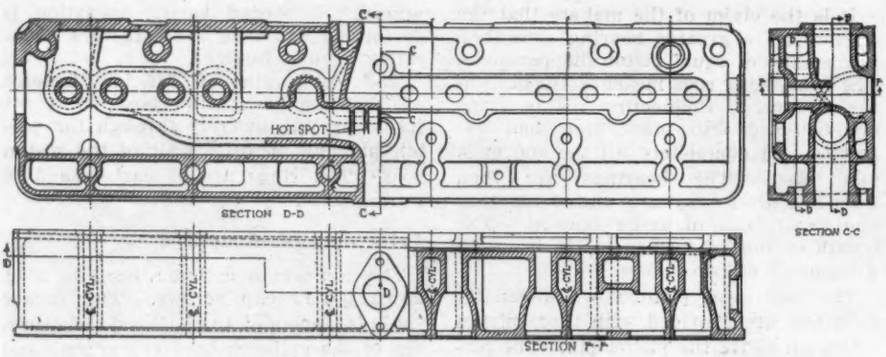


Fig. 6—Sectional views of Velie removable cylinder head showing integrally cast hot spot vaporizer and water spaces

are hollow, and are of the mushroom type. A cushion of oil is constantly presented in the valve lifter and pushrod cup joint, and the usual noise incident to the action of overhead valves is greatly decreased.

The valve lifter assemblies are removable through the inspection plate holes by the removal of two cap screws for each assembly. The timing is as follows: intake opens seven degrees past top dead center, and closes 47 degrees past bottom dead center; exhaust opens 45 degrees before lower dead center, and closes five degrees past upper dead center. The clear lift is 5/16 in.; the tappet clearance is .004 in. warm. The valve cover plate is an aluminum casting. The warm air for the carbureter passes through a passage in this casting. The fitting on the carbureter, which takes the heated air from the exhaust above, has an auxiliary manually controlled butterfly valve for controlling the admission of cold air for speed work.

Velie Bodies

The Velie-made bodies are distinctive because of the genuine leather upholstery of curled hair formed to make a pad of uniform thickness. The wheelbase is 115 in. The chassis will be fitted with both open and enclosed bodies. The prices on the enclosed models have not been announced. The touring car and roadster list at $1395 f.o.b. Moline.

1922 Chalmers Have Many Body Improvements

A NUMBER of refinements in the body finish and appearance have been made in the Chalmers car for 1922. The chassis remains unchanged. A new type of fender has been adopted with a deeper crown and made from heavier gage stock. The new fender follows the contour of the wheel closer than the former style, giving a materially altered appearance. Drum type headlamps have been adopted, and on the enclosed cars cowl lamps of the same pattern are fitted.

Another material factor in altering the appearance of the car is the adoption of a new radiator shell with an aluminum bead. This bead surrounds the core and gives the front end of the car a distinctive appearance. Disk wheels are now fitted as standard equipment, and these, in connection with a lower top, accentuate the long lines of the car.

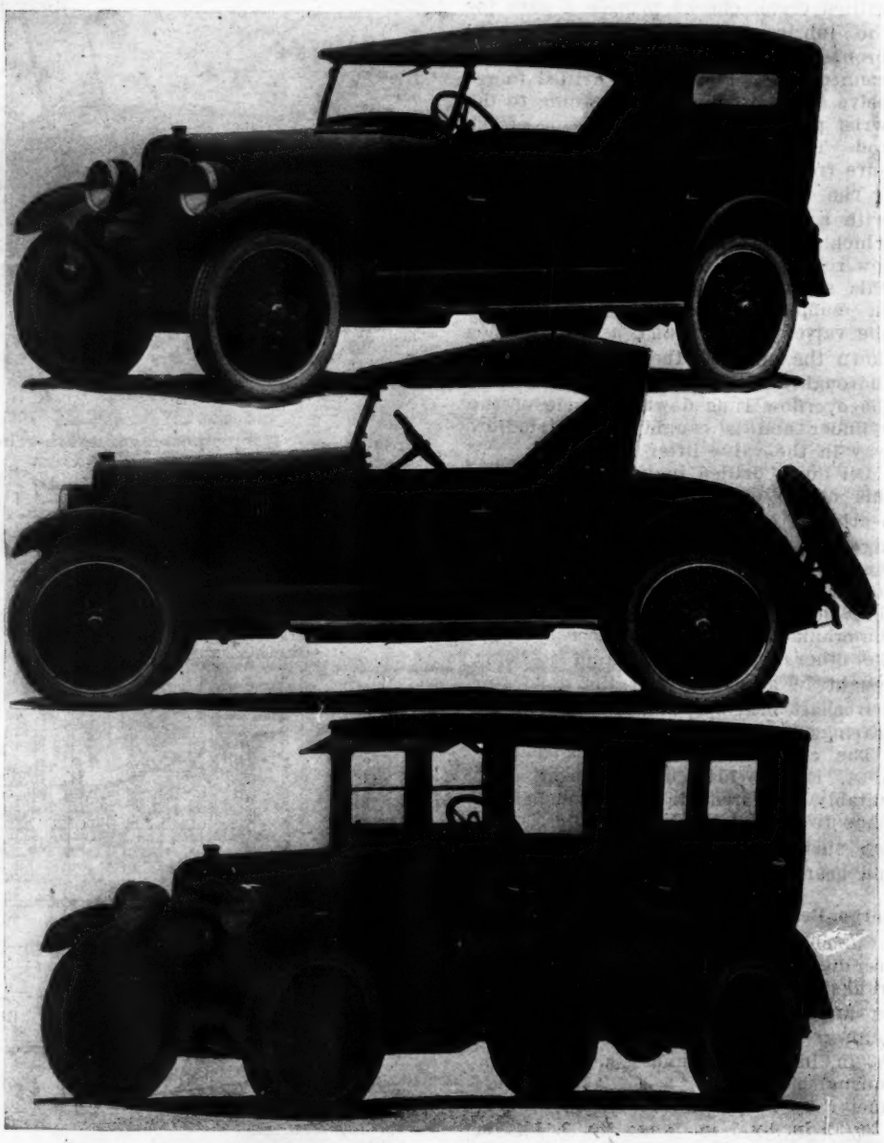
Carrying out the low effect, there is now a one-piece windshield in place of the two-piece type formerly employed. In the construction of the top, all of the seams have been made water-tight and there are now exposed bows, one bow having been eliminated in the new model. In all the body models, the tool kit is now in the left front door, and the side curtains are carried in flat pockets outside of the regular door pocket.

Dull Finish Moulding

One of the refinements in the finish of the body is the addition of a dull finish moulding strip around the top edge. Kick pads and foot pads are placed on the apron and runningboards, and on the roadster there is a trapdoor in the deck.

For more accessible control, the starter has been placed between the clutch and brake pedals, and the dash layout has been rearranged to secure greater accessibility of the instruments

Prices of the car are: for the Model C roadster, $1245; C, five-passenger touring car, $1295; C, coupe, $1995; C, sedan, $2295, and B, seven-passenger touring, $1395. The sport model has been discontinued, as it is practically duplicated in the present five-passenger model.



Top to bottom—Seven-passenger touring car mounted on new series Chalmers six chassis for 1922—New roadster body with disk wheels, drum type headlamps—New series Chalmers six sedan

1922 Gardner Car Shows Many New Features

THE Gardner Motor Car Co., St. Louis, in addition to having made many improvements and refinements in its roadster and touring models, has brought out a sedan designed to furnish the public an enclosed car at a moderate price and yet affording all the comforts and conveniences usually found in the higher priced enclosed models.

The chassis remains practically the same, inasmuch as nearly all of the former units are retained, but with certain refinements in design and construction. For one thing, the frame has been stiffened with the addition of another cross member, thus materially doing away with weaving and side sway.

Body Strains Minimized

This, together with the fact that the body moulding, particularly on the new sedan, is rolled into the panels instead of being attached with screws, and similar other structural changes help greatly to eliminate squeaks and cracking off of paint. The frame is 4½ in. deep and tapers at the front end to permit of short turning radius, the latter being 18 ft. The wheelbase is 112 in.

Among the major changes in the new Gardner are the following: use of cord tires with heavy tourist tubes; spiral bevel gears in axle; spiral bevel driving pinion integral with drive shaft; aluminum body moulding; leather upholstery; deeper cushions; Alemite system of lubrication; larger and improved front axle tie rod bolts; oil pressure gage on dash; new style top; improved brake band adjustment and improved body construction.

Lycoming Engine

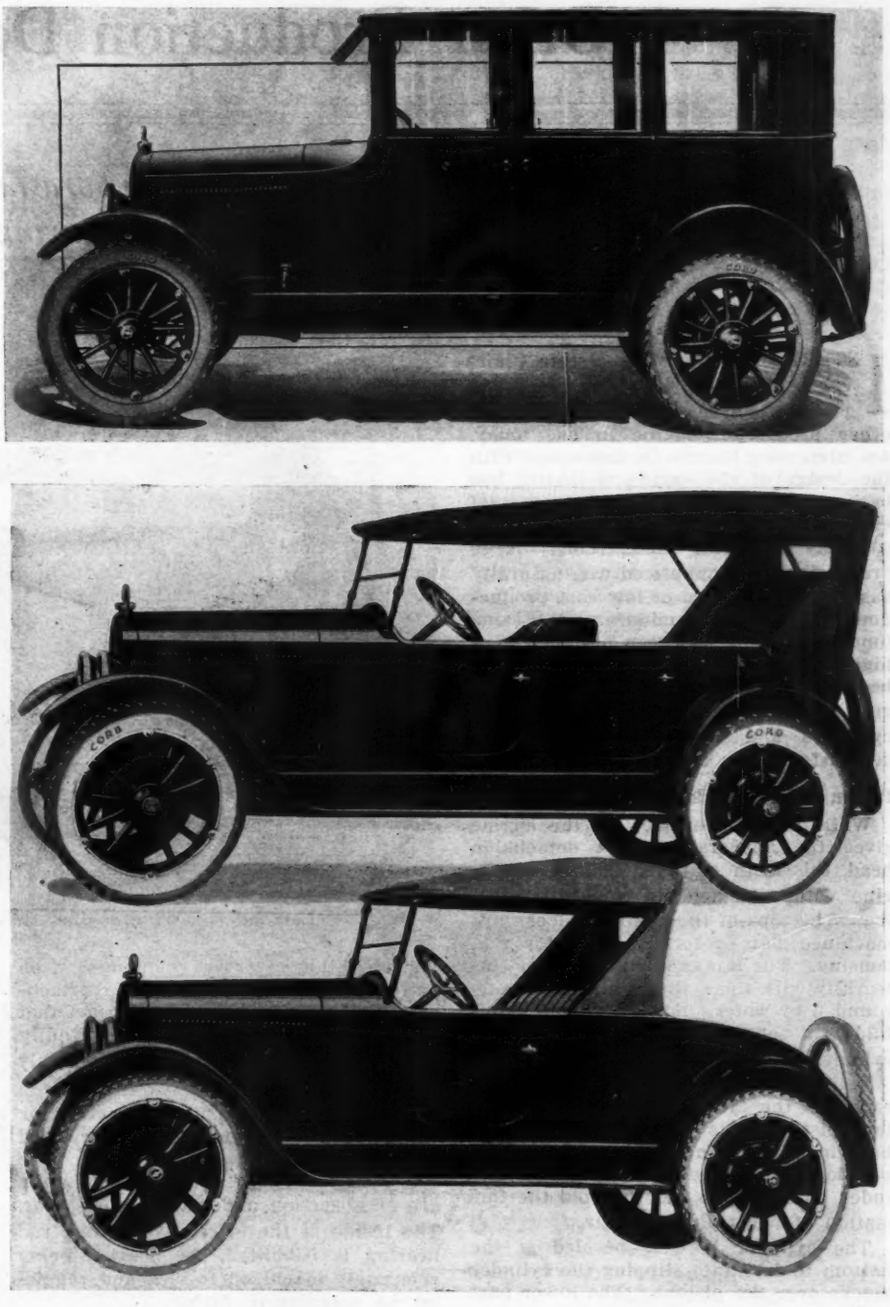
The rear axle gear ratio is 4.49 to 1. Steering is of the irreversible type with a full worm and wheel. Semi-elliptic springs are used all around, the front being 38 in. long and the rear 51 in. The weight of the car is said to be 2200 lbs. Both front and rear axles are equipped with Timken and Hyatt bearings. The engine is a four-cylinder Lycoming with cylinder dimensions 3½ in. bore by 5 in. stroke. The S. A. E. rating is 19.6 hp., with an actual brake horsepower of 35 at 2000 r.p.m. Cooling is effected by the thermo-syphon system in conjunction with a Fedders radiator of five-gallon capacity. Carter carbureter is standard equipment. A Borg & Beck dry plate clutch is used. This year Mechanics Machine universal joints are employed. The rear axle is three-quarters floating type.

A rather unusual departure for a car of this type, which has heretofore only been found on higher-priced jobs, is an aluminum body molding, which not only sets off the car to advantage, but has an additional function of completely deadening the sound of closing doors. Other additional features which add materially to the appearance of the car are a motometer and bar radiator cap, nickel finished, together with Goodyear all-weather cord tires on all four wheels.

A Perfection heater provides ample protection for winter weather, while a ventilation system secures a cool comfort car for the summer months.

The body frame of the sedan is made of hard maple, kiln dried. The metal panels are 20-gage steel sheets and are flanged by mechanical means, which practically eliminates solder and assures a permanently beautiful appearance.

The roof of the body is unusually substantial and of the silent type. Rotary type locks are used throughout the car. The window lifts are of automatic construction. A large tilting steering wheel with non-slip rim and aluminum spider is a feature which appeals. A dome light, artistic and unobtrusive, is the final touch to the furnishings of the car. The sedan is upholstered in 21 oz. all-wool body cloth, supported by curled hair padding in cushions and backs.



The 1922 Gardner touring car and roadster incorporate many new refinements in the chassis and body. A sedan is now added to the line to furnish an enclosed car at a moderate price

Wills Sainte Claire Engine Differs From Any Other Production Designs

Though a High Class Unit Incorporating Smoothness and Good Performance, Manufacturing Costs Have Been Held Low by Ingenious Engineering

INTEREST in the Wills Sainte Claire car centers largely about the power plant, which is altogether unlike any other production engine in use today. An interesting feature in connection with the design of the engine is that it has been worked out by a man who, as chief engineer and production manager of a company noted for its extremely large production of a low-priced car, naturally has had the problem of low cost production continuously in mind. At the same time, the engine has been designed as a high-class unit in which the utmost has been done to secure smoothness and good performance. The use of eight cylinders and the overhead camshaft demonstrate this clearly.

Piston Rings Overlap

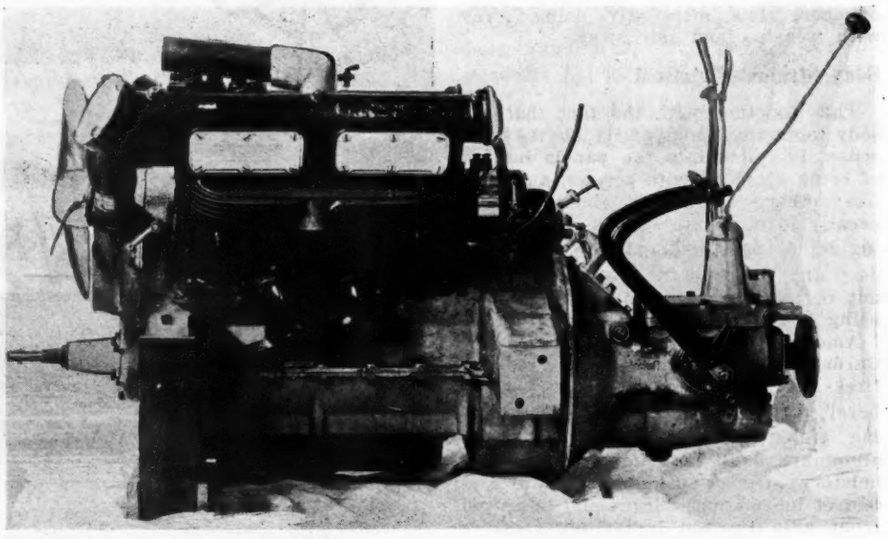
While an exterior view of the engine gives the appearance of a detachable head, this is in reality a solid head engine with a detachable camshaft housing. The tops of the cylinder blocks are machined flat to form a seat for this housing. The intake manifold is cast integrally with the cylinder block and surrounded by water, and the exhaust manifold is a separate casting bolted to the cylinder block.

A little kink in design which is interesting is the fact that the top and bottom piston rings overlap the cylinder bore in the top and bottom dead center position. This is done to keep the cylinder bore smooth and to avoid the formation of rings, due to wear.

The cylinder bore is beveled at the bottom to facilitate slipping the cylinder blocks over the pistons. The lower part of the cylinder barrels extend down into the upper crankcase to reduce the overall height of the engine. Each cylinder block is held down by studs screwed into the upper crankcase.

Valve Grinding Facilitated

A question which is raised in connection with the solid head type of engine is the difficulty in grinding the valves. It is claimed for this engine that it is easier to grind valves on this particular solid head engine because it takes no longer to remove the block from the crankcase than it does the ordinary type of detachable head because the same number of nuts and capscrews are used.



Left side of Wills engine, showing arrangement of manifold

The operation of actual grinding can be performed on a bench with the detachable blocks, and because of the fact that it can be done on the bench it is readily possible to clean the blocks thoroughly after grinding.

In accordance with usual practice for eight-cylinder engines, the articulated type of connecting rod is used. The connecting rods, both forked and plain, are of E section and machined all over. The inside of the bronze connecting rod bearing is babbitted, the bearing being accurately machined to size and requiring no scraping or fitting.

Camshaft Drive Novel

One of the unusual features of the engine is the drive of the overhead camshaft. The drive progresses from the crankshaft by spiral bevel gear and pinion to an intermediate shaft. Spiral bevel gears take the drive from this point to each of the overhead camshafts. Inserted in the drive is an Oldham coupling with offset driving lugs, so that it is only possible to set the camshaft housing back in the same position as when it was removed, thus avoiding difficulty in preserving the timing of the engine when working on the camshaft assembly. The camshafts are molybdenum steel and each camshaft is carried on three plain bearings, the rear bearing being of special design to eliminate the noise due to unsteady rotation of the camshaft.

Exhaust Valve Composition

As an example of the care which has been taken throughout the design of this engine to have the particular alloy employed suitable for the part, the composition of the exhaust valve is of interest. In order to keep the expansion of the stem and head down, Invar, a nickel alloy steel, which is used very frequently in measuring instruments and characterized by a very low coefficient of expansion, is employed. The valve rim, which is exposed to the high temperature of exhaust gases, is of tungsten alloy to impart the necessary heat-resisting qualities, and the tip of the valve subjected to the continuous contact of the valve follower and consequently requiring extreme qualities of hardness, is made of chrome cobalt steel.

The intake valves, which are not subjected to such high temperature as the exhaust valves, are made of chrome steel. The valve springs are held on the valve stems by a split collar, and a cork

washer is employed to prevent the oil from flowing down past the valve stem and guides into the cylinders.

Thermo-Syphon Cooling

For simplicity, a thermo-syphon cooling system has been adopted. The entire cooling system comprises the radiator, the combined gas inlet and water outlet unit bolted to the top of the cylinder block, the right and left water intake manifold and the cylinder water jackets. The capacity of the system is 6½ gallons.

Has Automatic Fan Release

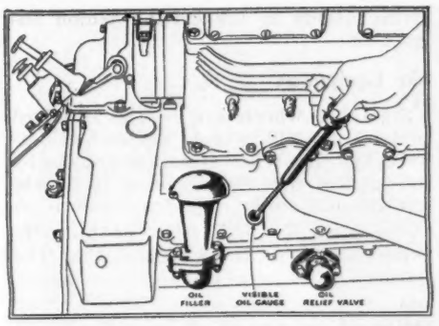
The radiator is of the tubular type made up of 155 copper cooling tubes with 135 horizontal cooling fins. The radiator is flexibly mounted on two coil springs. For unusually hot regions, the cooling system is augmented by a condenser placed under the front end of the right splasher. The condenser operates on the principle that the recooling of the radiator creates a sufficient vacuum to draw the condensed water back to the cooling system. This is similar to the systems which have been successfully employed for recondensing anti-freezing solutions in an independent condenser.

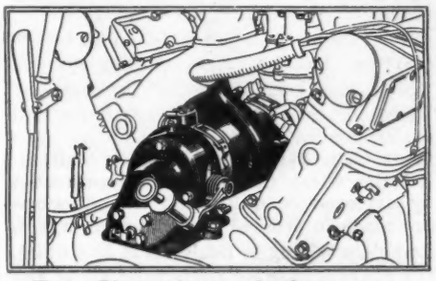
The automatic fan release is probably the most unique feature of the Wills Sainte Claire cooling system. A conical bronze bushing is pressed into the fan hub. The fan is pulled backward against the steel cone of the fan shaft by a spring. The fan is similar in action to a propeller and tends to move ahead on the shaft. When the fan speed reaches a certain point, the forward pull of the fan, due to the reaction of the air, is stronger than the backward pull of the fan spring. The fan is then pulled off the steel fanshaft cone and slips on the cone like a disengaged cone clutch. When the fan speed drops, the backward pull of the spring overcomes the forward pull of the fan and the fan reseats itself. To prevent any seizing from the constant slipping of the bronze fan cone on the steel fanshaft cone, both surfaces are lubricated by oil delivered through the hollow fanshaft.

Fan Speed Limited

As the speed of the fan cannot exceed a certain set limit, the power absorbed for driving the fan is also limited, regardless of how fast the engine may rotate. The speed at which the fan is released is regulated by the spring tension and is generally set at about 2000 engine revolutions, which corresponds to 3000 fan revolutions. The fan is a three-blade type and is driven off the timing gearset. The fan and generator drive gear is of Fabroil and is located at the front of the engine and inclosed by the aluminum crankcase timing gear cover.

Oil circulation is by a gear pump, the oil being under pressure to all of the engine bearings. The oil pump is located in the center of the oil sump in the lower crankcase and driven by a vertical shaft off the intermediate shaft through a worm and worm wheel. The pump is attached to a transverse rib of the lower





Top—Plunger type of oil gage employed on Wills Sainte Claire engine. Bottom — Mounting of generator within the center of the V on Wills Sainte Claire car

crankcase and completely inclosed by a screen. Both the pump and screen may be removed through the oil drain hole provided in the sump base. The oil is circulated through an oil relief valve of the plunger type located between the oil pump and the crankcase oil header.

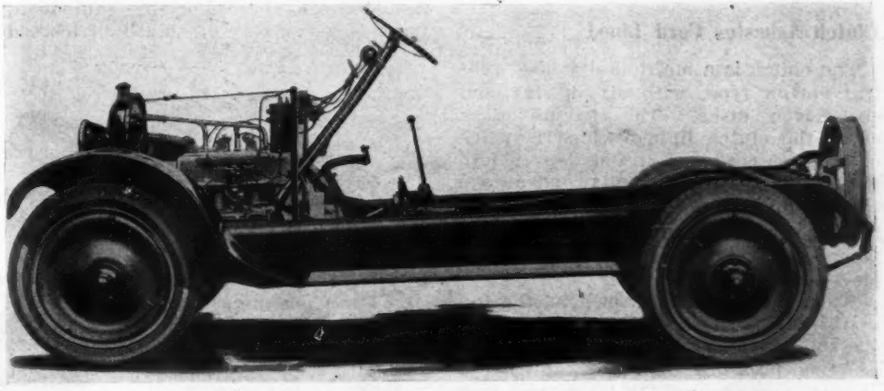
From this header, it branches off into four circuits for the crankshaft, right camshaft, left camshaft and fanshaft. The camshaft circuit includes leads to the three main bearings through the hollow crankshaft to the crankpin and then out through holes drilled in the connecting rod bearing, where it lubricates the surfaces on which the plain rods bear.

The oil thrown off the crankpin and the connecting rod bearings lubricates the cylinder walls and piston pins. A detail in connection with the crankshaft oil hole is that instead of being drilled in the customary way, they are drilled off-center and the opening is formed like a scoop, which greatly assists in picking up the oil.

Camshaft Oil Circuit

The camshaft oil circuit is so arranged that the oil flows from the oil header to the center camshaft bearing through a lead drilled in the upper crankcase half, then through a tube inserted in the cylinder block and through a lead drilled in the camshaft housing. It then flows from the camshaft center bearing to the inside of the camshaft through a hole drilled radially in the camshaft.

The camshaft is hollow and has two



Reo Making a Taxicab Chassis

DESIGNED and built expressly for taxi service, a taxicab chassis, to be known as Model V, has been announced by the Reo Motor Car Co. Foremost among the qualifications necessary for successful operation in taxicab service are the durability and stamina that will resist hard usage and rough travel, supplemented by reasonable speed, quick and dependable self-starting, quick pickup and ample spring resiliency. Economy of operation, and particularly economy of maintenance, also are vital factors.

Being a combination of the best units of Reo passenger cars and Reo speed wagons, and mounted on a frame especially designed for taxicab work, the new Reo model enters the field as a tried and tested job.

The wheelbase of the new chassis is 113 in., which is seven in. shorter than the touring car and 15 in. shorter than the speed wagon. The turning radius is 19 ft. The engine is the four-cylinder used in the speed wagon. It has a 4⅛ in. bore with a 4½ in. stroke; cylinders are cast in pairs with head integral. Transmission is of selective type, equipped throughout with Hyatt roller bearings. Clutch is multiple dry disk type with 13 steel plates. Rear axle is full floating and employs large Timken bearings. The steering gear is adjustable bevel gear, and internal sector and pinion type.

Springs are two inches wide, being 38 in. long in front and 54 in. long in the rear. Wheels are 32 in. by 4 in. Tuarc disk steel, carrying 33 by 4½ in. Royal cord nonskid tires. Electrical equipment includes starters used on Reos for many years. A sub-frame carries all important working units, thereby relieving them from road stresses and strains.

tubes with expanded ends pressed onto them, one on each side of the center bearing to an annular space between the tube and the camshaft bore. From this space oil is delivered to the cam face through a hole drilled in the base of each cam, lubricating the cam face, the valve followers and the valve stems.

One hole in each tube thus delivers oil to four cams and consequently is limited to only the required amount, which would probably be exceeded were the oil holes in direct communication with the camshaft bore instead of with the hole drilled through the tube.

Fanshaft Lubrication

Oil flows to the front and rear camshaft bearings through the hollow camshaft. The rear end of the camshaft is closed by a plug and the front end is closed by the camshaft front nut. Oil flows through two holes drilled in the camshaft front nut and lubricates the camshaft drive spiral gear and the camshaft spiral pinion. Excess oil in the camshaft housing is returned to the crankcase through leads inserted in the front and rear ends of the cylinder blocks.

In lubricating the fanshaft, the oil flows from the oil header to the fan plain bearing through an oil lead drilled in the upper crankcase half and through a copper tube cast in the timing gear cover.

Clutch Asbestos Cord Lined

The clutch is a multiple dry disk, central spring type, with six driving and six driven disks. The driving disks carry the clutch lining, which is made of asbestos cord and strands woven into the disks. The particular advantage claimed for this construction is that with the asbestos cord lining the friction surface is built up of a number of cords placed alongside each other.

When the clutch is thrown in, the top of the cords comes first in contact with the unlined disks and then flattens out as the pressure increases, giving a smooth engagement. It is claimed that with the usual riveted clutch lining, after the car has been driven some time, it is worn down to a smooth surface, and when the clutch is engaged the entire surface comes into contact at once.

There is only one universal in the drive, this being at the front end of the propeller shaft. It is an all metal universal of the yoke type. The universal pin is carried in bushings welded to the housing and is connected to the yoke keyed to the propeller shaft by a two-piece ring. A torque tube of seamless steel tubing incloses the propeller shaft, which is connected with the driving pinion through a splined sleeve.

The rear axle is semi-floating, with spiral bevel drive. The differential assembly, including the driving gear, the four differential pinions, the differential spider and the differential side gear, is supported in the carrier by two double row ball bearings. Both the pinion and the driven gear are adjustable. There is an inspection plate on the torque tube, giving access to the driving pinion adjustment.

The Equipment

Steel disk wheels are used as standard equipment. The wheels are dished outward and are Wills design and made by Budd. The tire equipment is 32 by 4½ straight-side cords. The front axle is an Elliott type, the front wheels being supported by double row ball bearings. The steering gear is worm and full wheel, and is fully adjustable. The turning radius of the car is 20 ft. 5 in., which is unusually short.

The electrical equipment comprises a starting, lighting and ignition system, which has been specially designed by Delco for this car. The distributer and motor generator are driven by the fanshaft. The battery is a six-volt Willard. All the wires in the car are protected by armored conduits, and the junctions are made in pressed steel junction boxes. Complete wiring is made up in two units, the chassis harness containing all of the wire from the instrument board to the various lights, to the backing light switch and to the steering gear, and the motor wiring harness containing all the wires from the instrument board to the distributer, motor generator and from the distributer to the plugs.

The lamp equipment is unusual, the headlights being equipped with a magnetic control for tilting the reflector, and, in addition to the usual lamp equipment, there is a courtesy or side light located on the left hand side of the body in line with the windshield post and at about the height of the fender crown. This side light has a 21 cp. bulb and throws a beam directed downward and backward. The purpose of the side light is to illumine the left side of the road to protect the passengers while entering, leaving or standing alongside the car at night, and to show clearly to approaching drivers how much clearance they have while passing. In addition to red tail light, there is a backing light in unit with it, which is automatically switched on by going into reverse.

Steel Panel Body Construction

The open bodies are built by the Budd company of Philadelphia. They are of pressed steel panel construction, spot welded together. The upholstery is genuine leather, with Marshall springs in the cushions. All of the cushions are reinforced on the bottom by heavy steel wire screening to hold the shape. The upholstery is detachable, the cushions, backs and sides can be replaced quickly and securely in case it is necessary to repair a body panel.

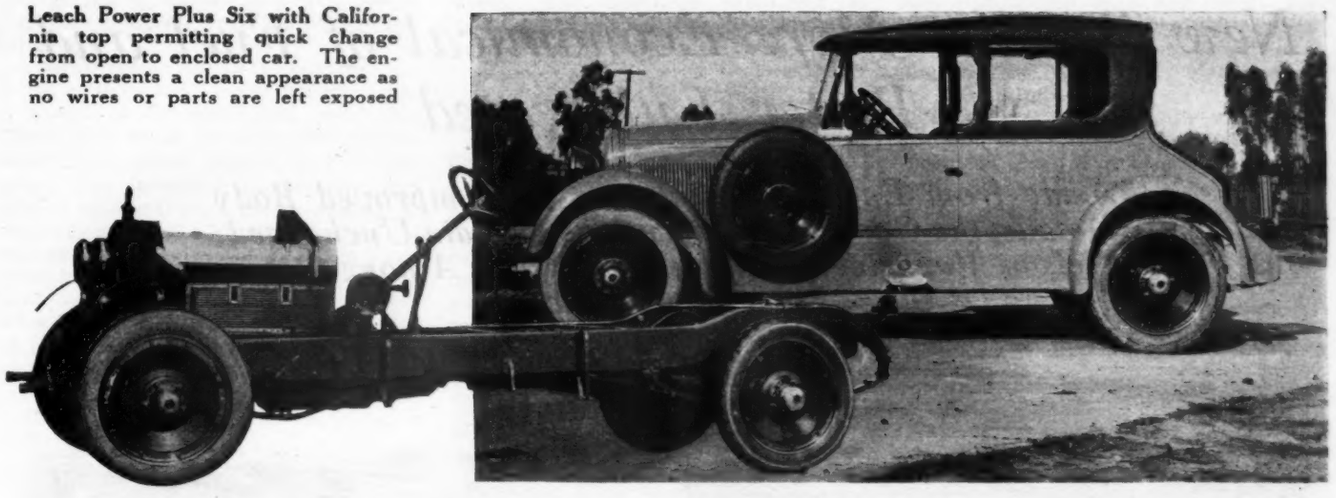
The coupe seats four passengers, and is distinguished for its lowness, the distance from the top of the roof to the ground being but 73 in. The instrument board is of harmonious design and carries the Delco switch with lock, Waltham speedometer, Weston ammeter, oil pressure gage, choke button, ventilator button and instrument board light.

Nera-Car—Two-Wheeled Vehicle

AN automobile on two wheels is the main thought which brought about the design of the Nera-Car, a small vehicle resembling in some ways the motorcycle. It is intended primarily to supplant the motor car where very often an excess of machine and energy is called into play to transport only one person.

Its riding comfort is amplified, it is stated, by the ideal saddle mounting on coil and flat springs, giving a true vertical movement, free from pitching and lateral motion. Additional riding comfort is claimed through the use of 26 by 3 in. tires, much oversize for a vehicle weighing about 165 lbs. The wheelbase is 55½ in.

The car is easy to operate. The throttling levers are in finger reach of the righ-hand grip on the handlebar. The starter pedal is well placed for the left foot. An easy turning of the left-hand grip has the same effect as throwing in or out a clutch, but much softer. The five-speed drive secures smooth acceleration and is operated by a lever within easy reach of the right hand. The 2½ hp. engine has ample power for the car's light weight, and with its five-speed transmission gives good hill-climbing ability. Maximum speed on level roads is 35 m.p.h. Footboards are covered with pyramid aluminum mats fastened with split rivets, making them easy to replace, and giving a lasting and pleasing appearance.



Leach Power Plus Six with California top permitting quick change from open to enclosed car. The engine presents a clean appearance as no wires or parts are left exposed

High Power and Accessibility Chief Features of New Leach Power Six

ACCESSIBILITY, power and general simplicity of design, are the features of the new engine used in the Leach Power Plus Six, a California-made car. The engine was designed by Harry A. Miller, who for years has been building racing car engines. Many current practices of racing engines are incorporated in the new Leach engine. A minimum of moving parts is used, and through the use of side plates and a polished aluminum cover, which incloses it, the engine is very accessible.

The engine is of the six-cylinder overhead camshaft valve-in-head type, with a 3¾ in. bore and 5¼ in. stroke. The S. A. E. rating is 33 hp., but brake tests show 107 hp., it is stated. A feature of the engine is the use of spiral bevel gears for driving the fan, water pump and camshaft.

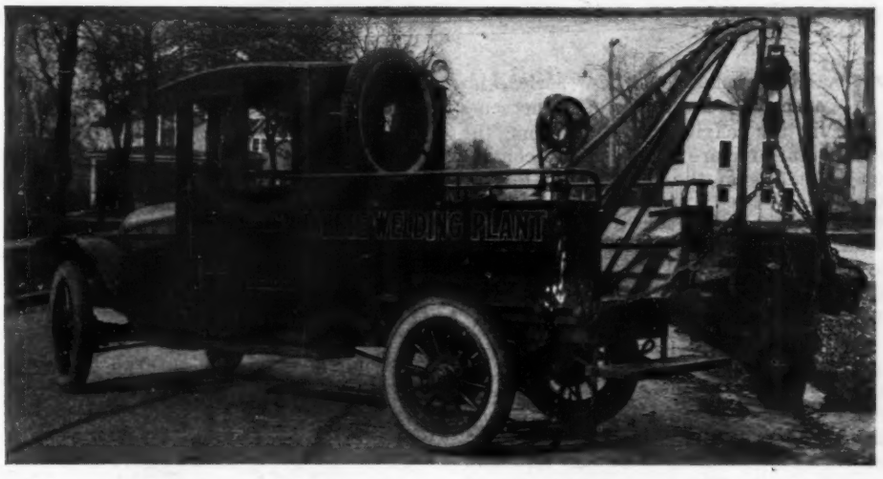
The left side of the engine is entirely "clean," no parts or wires being exposed, while on the right only the manifold and carbureter are visible. The exhaust pipe passes well below the arm of the transmission and floorboard. Pistons are removable from either the top or bottom of the cylinders—a good service feature.

Large water spaces are provided around each cylinder the entire length of the barrel, giving an exceptionally well-balanced cooling system, a safeguard against overheating. Lubrication is accomplished by pressure feed. Alemite also is used.

A number of changes have been made in body design, and the wheelbase has been lengthened to 134 in. New springs of heavy design make shock absorbers unnecessary. Minor changes have been carried out on the California top, as all models are of the enclosed (convertible) type, sliding plate glass windows permitting the change from open to enclosed car. A one-piece windshield is used, and a sun visor has been added to the equipment.

New models are completely equipped with six Disteel wheels, Goodyear cord tires, individual steps and fenders, front bumper with combination rear bumper and trunk rack with nickeled guard rails, combination dash and trouble lamp with 18 in. of cord, cigar lighter, cowl ventilator, motometer, gasoline gage on dash and tank, odometer, special traffic signal device and Waltham eight-day clock-speedometer. The cars are finished in heavy leather with silk mohair headlining, while the top is Fabricoid.

The Leach-Biltwell Motor Car Co., Los Angeles, now is specializing in colors and is producing five models, all $6500 f.o.b. factory.



Service Truck Does Double Duty

THE service truck shown above is used by the Hobbie Welding Plant, Hampton, Ia., to call for and deliver heavy welding jobs, as also for towing disabled cars.

This truck is completely equipped and can easily handle a 3000 lb. load from the end of the derrick, which extends about six feet back of the rear axle line. The truck can be used as a "carry-all," taking men out to jobs.

It has a pull cable direct from the rear axle, to be used on heavy pulls, also a pull bar from the rear step.

The equipment consists of shovels, sledges, steel stakes, hooks and chains and two steel cables, one for use in connection with a snatch block to give double pulling power to the truck when getting cars up embankments. A portable gas light which can be set out on the ground wherever convenient, besides a spotlight on the top of the cab is used. In towing cars, a short "Y" pull bar is employed in picking up the front end of the car, and often one man will bring a car in alone, leaving the second car in gear, switch and throttle on, so that when he starts the truck the motor in the disabled car helps propel and relieves the pulling load of the truck motor.

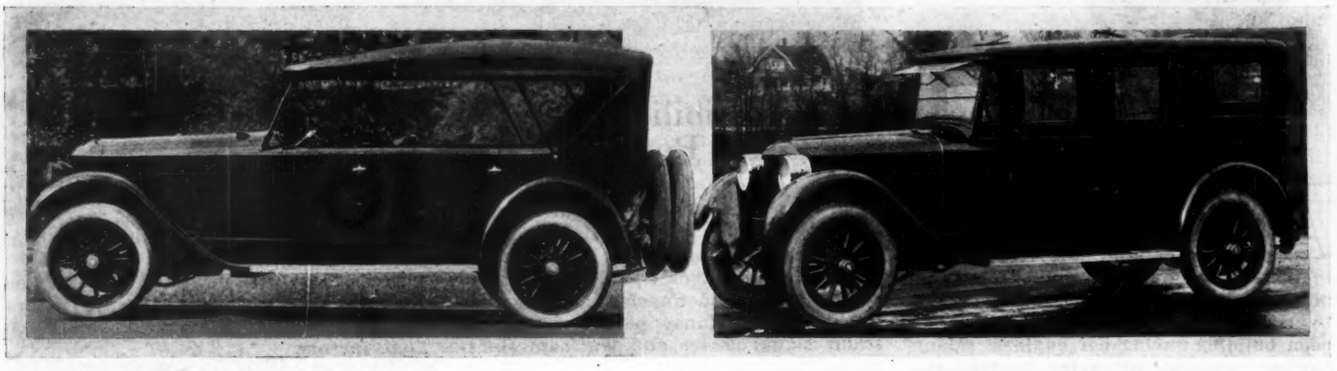
This truck is one of two built, using a Willys-Knight 88-4 motor and reinforcing the chassis, with four springs on the rear axle and equipped with Republic cord tires. The total weight of the car is 4600 lbs. and it readily travels at 40 m.p.h.

In order to make this investment pay, they advertise, "When in trouble on the road, telephone us and we will pull any car to any garage in our city."

New Premier More Economical of Fuel and Better Lubricated

Aside from Engine Refinements and Improved Body Details, the General Specifications Remain Unchanged; Nelson Vaporizer and Nelson Piston Among Power Plant Improvements

By J. EDWARD SCHIPPER



Seven-passenger Premier touring car mounted on 6-D new series chassis. Right—New seven-passenger sedan body mounted on new series 6-D Premier chassis

THE Premier 6-D, new series, incorporates a number of refinements in the engine, largely from the standpoint of more efficient and economical handling of the fuel and better lubrication. The structural parts of the chassis remain the same as in the previous model, and the bodies have been altered in detail. The main specifications of the car remain the same as for 1921.

The Nelson vaporizer takes the place of the former water jacketed intake. In this vaporizer, part of the exhaust is carried across the cylinder block through a steel tube contained in a cored passage in the block between cylinders Nos. 3 and 4. The gases are conducted by this pipe to the exhaust jacket of the vaporizer, which is located in an elbow in the intake, just before the gases enter the cylinder head. The exhaust gases are permitted to flow around the ribbed vaporizing stove in this elbow and pass back through a separate line to the exhaust pipe, entering it at a point just before the muffler. At this point there is a T connection to take care of this inlet.

Entire Intake Walls Heated

In making the installation of this vaporizer, the former exhaust passage has been reduced in section sufficiently to make up for the additional exhaust piping, due to the requirements of the new vaporizer. This results in sufficient back pressure in the main exhaust passage to cause a flow of exhaust gases around the vaporizing stove in the inlet.

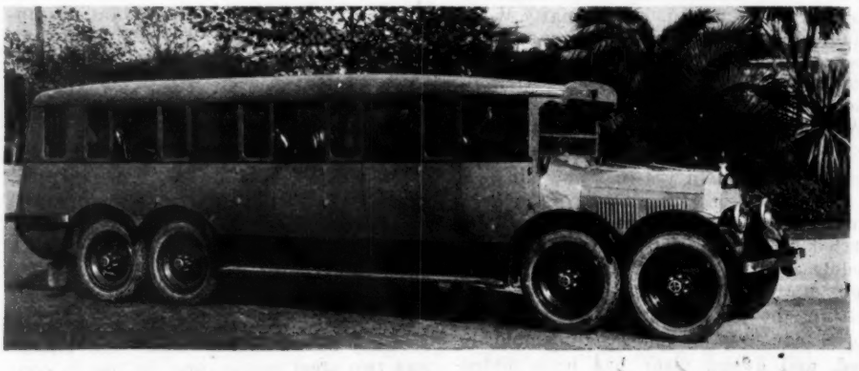
The vaporizing stove being installed in an elbow, gives a combination hot ring and impinging type of vaporizer. Due to the use of the elbow, the heavier particles of fuel are thrown against the outer circumference of the elbow circle into one part of the stove, while any of the fuel which is creeping along the walls of the inner radius comes in contact with the stove also.

The Nelson Piston

Inasmuch as the corrugations extend entirely around the circumference of the inlet pipe within the jacketed elbow, there is no portion of the intake wall unheated, which, in this way, prevents any possibility of seepage of raw gasoline along the walls.

In addition to the new vaporizer, a new piston, which is also a Nelson patent, has been added. The Nelson piston is an aluminum alloy type, expanded to an oval shape while cool. The piston is machined from .010 to .012 in. undersize, and then is expanded at right angles to the wrist pin by a bar or strut. It is expanded in this way from .002 to .00225 in. clearance in the plane of this expander. The theory of the piston is that this expander puts the initial expansion in the piston, so that under heat no further expansion takes place in the plane of the expander. In other words, as the piston

Something a Bit Different in Bus Construction



The new Fageol eight-wheeled motor bus, built to carry 20 passengers, which has undergone all tests to which it has been put in running 5,000 miles on the roads in and around San Francisco, where it was designed and built by R. B. Fageol, of Oakland, Calif.

becomes warm, it assumes a round shape and more completely fills the bore of the cylinder.

A detail refinement in the construction of the cylinder head is the incorporation of a slot in the metal just below the spark plug so as to bring the cooling water into closer proximity with the plug. The increased compression and altered characteristics of the engine, in consequence, have brought about a change in the valve timing. The camshaft has been changed to close the exhaust and open the inlet at four degrees after top dead center. The inlet closes at 60 degrees after bottom dead center, in place of 45 degrees, and the exhaust opens at 52 degrees before bottom dead center, in place of 45 degrees, giving a higher speed timing.

Electric Gearshift Optional

Flanges have been put on the connecting rod bushings so as to provide stiffness and render them independent of the connecting rod bearing caps in this respect. The bearing has been so arranged that the shims are now flush with the edges of the bearing and, consequently, there is no cutting or oil scraping edge at the point where the bearing cap joins the bearing. Another improvement in the oiling system is the increase in size of the oil suction line to 3/8 in. in place of 5/16 in. Oil tightness has been increased by the placing of gaskets under the cap which fits over the valve action.

The Borg & Beck 10 in. clutch is continued with the refinement of 10 splines instead of four. The transmission gearset remains unchanged except that in place of the Cutler-Hammer electric gearshift, the hand shift has been added. The Cutler-Hammer is now listed as special equipment at an additional cost of $200. The new cover also incorporates a shifter lock, and also has the inner lock integral with it, so that the new head can be assembled to the old transmission case.

The body lines have been improved and brought up to date. The enclosed cars now all have a sloping type of front. The instrument layout has been changed to give a better appearanec, and the curtains in the open cars are now carried in the front doors and the top is lined. Putting the curtains in the front doors has caused a new location for the tools, which are now placed under the front seat. In changing the dash layout, the clock and speedometer have been combined, and there are two instrument board lights instead of one.

General Dimensions Unaltered

The general specifications of the Premier car have not been altered for several years. It incorporates a six-cylinder, block cast engine, which is distinguished by the fact that it is the only American wet sleeve type of engine. The cast iron sleeve is pressed into the aluminum block and sealed by a gasket at the bottom. The cylinder bore and stroke are 3⅜ by 5½ in. The engine is the overhead valve type with helical camshaft drive, pump water circulation, splash pressure lubrication by gear pump. The electrical equipment is Delco. All the body types are mounted on the 127 in. wheelbase chassis.

Dort Adds Cheaper Enclosed Cars

DORT has added two cheaper enclosed models to its present line, a coupe selling for $1165 and a sedan selling for $1195, as against $985 for the touring car and roadster. The new models are upholstered in leather and equipped with heater, visor, etc. The older coupe, selling at $1495, and the sedan, at $1545, both upholstered in brown cloth, are continued.

The refinements in chassis construction include lighter rods and pistons, use of multiple disk clutch in place of the cone type, use of slightly wider face gears in the transmission, adoption of spiral bevel gears in final drive, use of split spring seats with shims between valves, and increased stiffness in fenders, runningboard aprons, splash pan and some other pressed metal parts. A Connecticut ignition coil and Alemite chassis lubricating system are now employed.

New Maibohm Sedan Has Refinement of Body Detail

THE Maibohm Motors Co., Sandusky, O., is bringing through this new sedan.

New features are the pronounced changes in body design, and different arrangement of windows gives a greater area of glass. Wide sport type fenders with flapping canvas guards and solid aluminum steps securely bolted to the frame are other features, and to this is added the flare created by the use of disk steel wheels, heavy nickel plated radiator, headlights and the two square coach type lamps on the sides. A cowl ventilator, controlled from the instrument board, and fully adjustable, is furnished, and also an adjustable visor in conjunction with the ventilating windshield of heavy glass.

The large heavy glass windows are fitted with roller curtains of silk, in shades that match the upholstery and finish. The door windows are operated by a single throw lever.

Two corner lights spread a glow throughout the interior, and at the same time keep the glare away from the passenger's eyes. The four full doors are each 23 in. wide and not cut off at the break of the rear fender—a feature prevailing in all Maibohm models.

The Falls valve-in-head six-cylinder high-speed motor furnishes the power for this latest addition to the ranks of closed cars. There is a heavier front axle and a heavier steering gear.

Nonskid cord tires are furnished as standard equipment. Special colors are available at added cost. This model lists at $2395 f.o.b. factory, although with heavy artillery wheels and standard fenders, it is only $2295 f.o.b. factory.

Merit, a Medium-Sized Car, Sells for $1985

THE Merit Motor Co. of Cleveland, is now in production on a medium-sized light car. The five-passenger touring and four-passenger open model both sell for $1894. The body is of aluminum on a hardwood frame, and is fitted with a one-piece windshield. The top is lighted with a dome light. The car is low and racy in appearance, and the angle and height of the seats has been designed to give every possible comfort to passengers and driver.

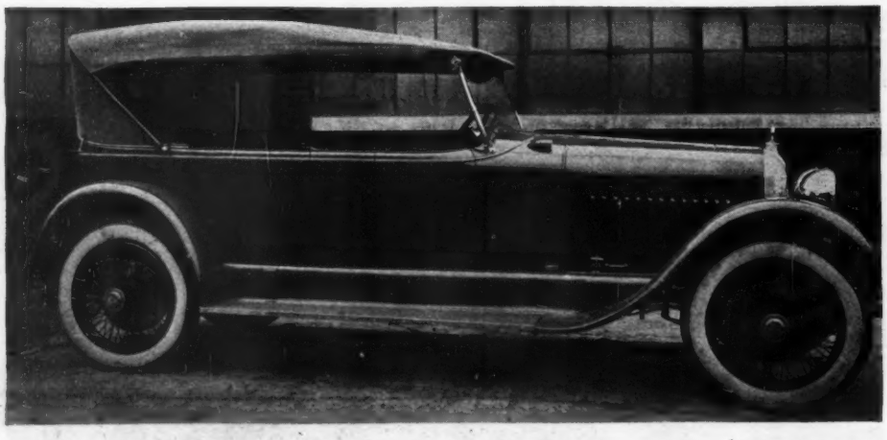
The engine is a Continental 7-R, six-cylinder, 3¼ by 4½ in. The electric equipment is Delco, carbureter a Stromberg and the radiator of cellular type. The clutch is a Borg & Beck; gearset, Muncie and Thermoid; Hardy universal joints and driveshaft connect the gearset with the Columbia rear axle.

In the spring suspension advantage is taken of a shackle arrangement which allows the car to swing low, giving ample road clearance. The bearings are of chrome steel, 58½ in. in the rear and 40 in. in the front. The frame is 5½ in. channel section.

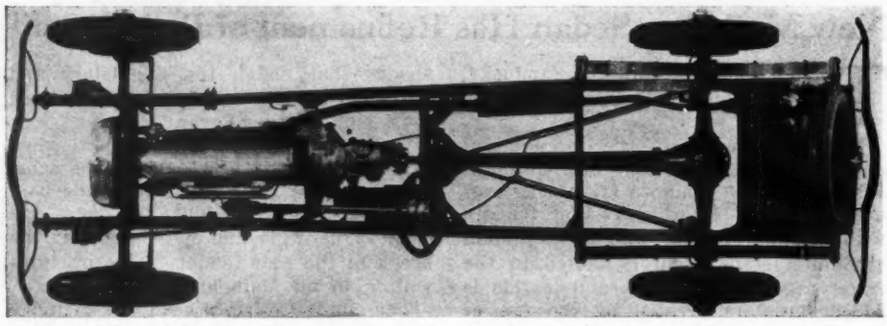
The wheelbase is 119 in., tires 32 by 4, and equipment includes motometer, spotlight, a speedometer, windshield cleaner and the usual equipment of tools.

Experience Gained in Racing Governs Duesenberg Straight Eight Design

Engine of 260 Cu. In. Displacement Develops 90 to 100 Hp.—Brakes on All Wheels Hydraulically Operated—Overhead Camshaft and Tubular Connecting Rods Used



Side view of the Duesenberg Straight Eight, showing the molding on top of body



Here is shown the disposition of the various units on the Duesenberg. The drive is taken through a sturdy tube yoked at its forward end to the middle cross member

THE Duesenberg Straight Eight is one of the most direct interpretations of automobile race track experience which has ever been offered the public. The engine, with a bore of 2⅞ in. and stroke of five inches, has a displacement of 260 cu. in., which develops from 90 to 100 hp. The upper half of the crankcase and the cylinder block containing the eight barrels are cast as a unit. The cylinder head is removable and incorporates the overhead camshaft and rocker arms. The valve and spring mechanism is enclosed by a detachable cover plate and the lower half of the crankcase and the oil pan are a unit aluminum casting removable while the engine is in the frame.

The pistons are magnalite, although cast iron will be supplied if desired. The tubular connecting rods are machined all over and equipped with annular cooling ribs at the lower end. The piston pin is held in the upper end of the connecting rod by a lock screw, the bearing being in the piston.

Three main bearings support the one-piece crankshaft. The camshaft diameter is 2⅜ in. at all main bearings and the bearing lengths are: front, center and rear, 2½, 2½ and 3 in. The lower connecting rod bearings are all 2 in. by 1⅞ in. It has been found that the use of a smaller diameter at the end of the throw than at the main bearing is a material factor in assisting balance of the crankshaft.

Combustion Chamber Polished

Spiral bevel gears and a vertical shaft are used for driving the one-piece, hollow camshaft which is mounted on five bearings. There are two valves per cylinder, each actuated by a forged alloy steel rocker arm and two concentric springs. The valves open downward into the spherical combustion chamber, which is polished to prevent carbon collection.

The vertical driveshaft is made in two pieces, so that the head can be removed and replaced without changing the valve timing, the driving lug on the vertical shaft being offset so that the head can only be replaced in one way.

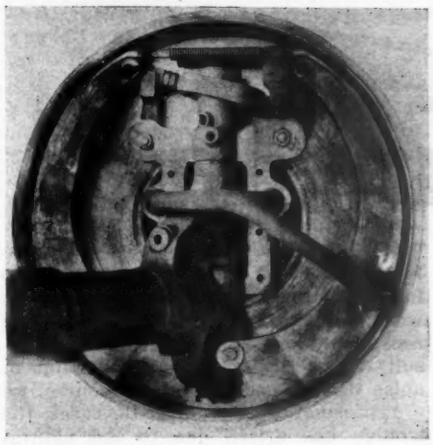
High pressure oiling is employed, the oil pump being driven directly from the crankshaft. This is a gear pump capable of delivering a maximum pressure of 250 lb. per square inch. The oil is led through the drilled crankshaft to all of the main bearings under pressure and also to the hollow camshaft and hollow rocker arm shaft. The pressure feed passes directly to the camshaft bearings and also to the rocker shaft bearings, from which it feeds to the valve driving contact points. The space beneath the valve action cover plate is really operating in a bath of oil mist, due to the high pressure employed and the large supply of oil forced into the head by the oil pump. The oil return passes over the camshaft driving gears, keeping these supplied with a bath of oil. The breather pipe is on the left rear end of the engine and has a hinged cap. It acts as the oil filling passage, and upon the front of the breather pipe is the oil level indicator gage.

Cooling Has Interesting Feature

The water pump is a centrifugal impeller type driven by a cross-shaft which receives its drive from the vertical camshaft driveshaft. The cross-shaft terminates at the water pump on the right and on the left delivers the drive through a set of bevel gears to the auxiliary shaft. The fan pulley is in front of the bevel gearcase and behind it, the drive is transmitted through a flexible coupling to the generator and distributor, which is mounted on the rear end of the generator.

An interesting feature in connection with the cooling system is that the water enters the block at the front right lower extremity of the engine and leaves it at a point just above the entrance point at the front right extremity of the block. The water circulation is guided internally by baffles.

Gasoline is fed from a 20-gal. tank located at the rear of the chassis, to a Stewart vacuum tank mounted on the dash. The 1½-in. Stromberg carbureter is located on the right side of the engine, the gas flow being vertically upward to a hot-spot contact with the exhaust manifold which is located on this side of the



A close-up of the front wheel brake mechanism on the Duesenberg. Water for operating the brakes is carried through the axle tube

block. From this point, the gas is taken through a straight passage between the two center cylinders across the block to the left side of the engine where it enters the aluminum intake manifold, which is of ramshorn design.

The clutch is a single dry plate type and the gearset a three-speed unit, providing ratios in the gearbox of 4.016 to 1 on reverse, 3.167 to 1 on first, and 1.1654 to 1 on second. The rear axle ratio is 4.6 to 1.

Triangular Torque Layout

The drive to the rear axle is through a double flexible joint and a tubular driveshaft enclosed in a torque tube. The car is propelled through this torque tube which carries a yoke at its forward end, hinged to the center cross-member of the frame, which receives the propulsion thrust. In addition, there are two radius rods which run from the extremities of the rear axle to the front end of the torque tube, giving a triangular torque layout.

The rear axle housing is of one piece, reinforced molybdenum steel. The pinion shaft is mounted on two double row annular bearings. The differential consists of a forged steel case enclosing the spider arm, four bevel gears and two side gears splined for the axle shaft. The axle shaft is hollow molybdenum steel, the shaft and hub being in one piece. The wheels are Rudge Whitworth mounted on annular ball bearings.

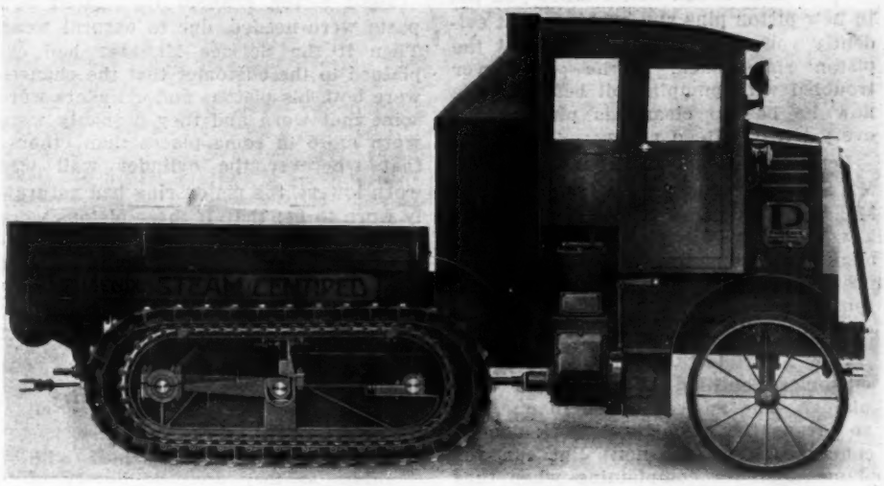
The front axle is also tubular and the axle ends and steering knuckles are of molybdenum steel. The axle is so designed as to incorporate the passages for the brake-operating fluid.

The brake drums are forgings 16 in. in diameter and are fitted to all four wheels. The drums are ground to give a perfect braking surface. Circumferential fins are machined on the outer edges to provide strength, lightness and radiating surface. The four brakes are operated by hydraulic pressure. A master cylinder is attached to the foot brake and the liquid is forced through the lines running to the four wheels by a piston in the master cylinder. A small cylinder in each of the four brakes has a piston which is forced upward by the liquid entering the cylinder. The piston at the brakes operates a toggle arm which, in turn, expands the two brake shoes in each brake. All four of these brakes are operated simultaneously by the service brake pedal.

Brake Featured

An interesting feature of the brakes is the fact that, due to the floating arrangement of the piston and toggle, the brakes are self-centering and, consequently, self-equalizing. Once the brakes are shut, they provide equal pressure against each drum. The liquid employed is water in summer time, and water with an anti-freeze solution, in winter.

The car is mounted on semi-elliptic springs, the front being 2¼ in. wide by 40 in. in length and the rear 2½ in. wide by 59 in. in length. The springs are equipped with the Watson Stabilators. The car has a clearance of 11½ in. under the front axle and 10 in. beneath the engine. The rear axle clearance is 10½ in. The bodies are of aluminum with steel fenders and the equipment includes bumpers and a spare wheel carried on a three-point mounting at the rear of the car. The tires are 33 by 5 in. all-around. The chassis is lubricated by the Alemite system. The price of the car will be between $6,000 and $7,000.



Phoenix Steam Tractor

ONE of the recent high pressure steam developments in the automotive industry is the new road locomotive built by the Phoenix Mfg. Co. This locomotive or tractor is designed especially for heavy hauling. The wheelbase, only 126 in., naturally means a short turning radius, while power supplied separately to each track laying wheel makes for turning in its own length limited only by the skidding that can be imparted to the front wheels.

The illustration suggests an independent engine mounted vertically on each side. Such is the design that speed of either engine, whether ahead or reverse, can be regulated at will by the driver. This feature is of value in steering, especially in making a short turn in slippery going and with a heavy load behind, all tending to keep the tractor plowing straight ahead.

Generous Overload Capacity

There is no differential, no double clutch to engage one or both track layers, and no brake by which the near impossible is attempted—i. e., to hold one wheel and through the differential throw the power to the opposite wheel, thereby tending to double its rotating speed.

Overload capacity and reserve power are practically new terms to the automotive industry, but in this tractor they are supplied in generous measure. At one-quarter cutoff, 300 lbs. steam chest pressure, based on a boiler pressure of 400 lbs. and 100 deg. superheated steam, the engines are designed to develop 30 hp. each, or 60 hp. by the two engines.

By lengthening the stroke, this power can be doubled, while for starting or pulling out of a hole, the low pressure cylinder can be simplified and the equivalent torque increased to 2 1/3 times that due to compounding at one-quarter cutoff. Engines are compound, double-acting high pressure, cylinder 3 1/3 in. bore, low pressure cylinders seven-inch bore, stroke five inches.

Boiler Construction

The boiler is the interesting feature of this power installation. It is of the drumless, sectional water tube, high pressure type invented by W. H. Winslow. Tubes are substantially horizontal and welded into vertical headers. The sections so constructed are mounted on top of a common mud drum and connected at the top with a common steam header or outlet.

The whole is then enclosed in a planished steel casing filled with suitable insulating material. Sections are hydraulically tested to 4000 lbs. Working pressures are practical up to 1500 lbs.

The tractor is rated at 10 tons, though weight is placed at 8½ tons, thereby increasing traction due to such a load; hence the rating of 10 tons, which is conservative in view of the combined weight of tractor and load—13½ tons.

Mr. Dealer takes his Pen in Hand

Lack of Understanding on Part of Customers Responsible for Many Complaints—The Service Manager's Duty

MR. SMITH has just driven up and informed you that his engine does sound better since you put in new piston pins and bushings, but evidently you must have failed to put the piston rings back, as he was never troubled with pumping oil before, while now he has to clean his plugs about every ten or fifteen miles.

Before you can finish explaining to Mr. Smith why his present trouble exists, Mr. Jones drives up and informs you, in a very angry way, that no doubt you might have tightened his connecting rod bearings, but evidently you broke something loose, as his motor now has knocks and rattles that it never had before.

Now the question is—are these two customers entitled to register a complaint? The answer is ten to one that so far as the mechanical work done is concerned, they are not. But can you blame them for complaining when they have trouble now that they did not have before? Would these two customers be dissatisfied, Mr. Service Manager, if you had taken a personal interest in their troubles, and explained to them what the result would probably be if the work was done the way they wanted it done?

It is admitted by many automobile dealers that the service or repair department is a very unsatisfactory branch of their business and in most cases is financially not even self-supporting.

It is, however, an established fact, that whenever a customer registers a complaint about some job that you have recently done for him, it is either through ignorance on his part—or the job was not done right. Of course, if the trouble is due to defective workmanship or material, it is purely a shop problem, which we will not discuss at this time, but, if the complaint is due to ignorance or misunderstanding on the part of the customer, then it is a problem squarely up to the Service Manager, which he should have looked into, not after the work was completed, but at the time it was first taken into the service station.

Now, in regard to the piston pins and bushings that Mr. Smith requested you to put in his motor. Presuming that his engine did need these parts, the question arises—What was the general condition of his engine, were these parts needed due to natural wear, or were the original ones too soft, or probably fitted too loose? This can be determined (before the worn parts are taken out) only by the knowledge of age of the engine and the approximate number of miles it has been driven.

Take it for granted that these new parts were needed, due to natural wear. Then if the Service Manager had explained to the customer that the chances were both his pistons and cylinders were somewhat worn and they probably were worn more in some places than others; that wherever the cylinder wall was worn lowest, the piston ring had naturally worn to fit; that, if these pistons were removed from the cylinders, which would have to be done in order to fit new pins and bushings, it would be impossible to replace the rings in the cylinders in the same position that they were before, the result being an improper fitting ring, loss of compression and oil pumping—would not the customer have given you instructions to install a new set of some good seating piston rings?

In the event that he would not, you would have done your part, and he could not make a "kick," because you had warned him as to just what the result would probably be. Of course, in many instances the cylinders will be found larger at one end than the other and probably scored some, in which case the only successful remedy is to regrind and fit with oversize pistons and rings. It has been the writer's experience, though, that if this has to be done, it is better to do a thorough overhaul job, if the customer will consent.

Now, as to the trouble that Mr. Jones has after you have tightened his connecting rods. Would you have this complaint from him if you had explained to him that in the event his pistons were worn, that tightening his connecting rods would cause them to "slap" and result in practically the same amount of noise that he had before. Of course, we are presuming that in both cases the trouble has arisen due to the natural wear of the parts in the question and not on account of having burned out, due to lack of oil or a defect in the oiling system.

It is the writer's belief that ninety per cent of the customers who have a complaint to make are justified in so doing, and eighty per cent of these complaints are caused by the Service Manager's not taking enough interest in either the job or the customer to explain to him just what the result would be if the work was done in certain ways.

It is very often the case that your customer stops by and calls to your attention some little noise which has developed in some part of your car or truck, and which you find to be some minor trouble that although of no consequence so far as the performance or welfare of the car or truck is concerned, would require quite a lot of labor to remove it. Then it is your duty to advise him to ignore this small trouble until some further time when other troubles will have developed, at which time the money he would have spent on this minor trouble can be applied much more profitably to himself.

In the event that there is going to be a complaint, it is better that it be over a bill than the work you have done, for the customer can forget the bill, but can never forget a bad job.

Complaints can be reduced to a minimum if the Service Manager will take a personal interest in each job when he receives it from the customer, and has the work done by competent men, furnished with the proper equipment.

P. H. FOREMAN.

This Is Your Page

Use and read it.

If everyone was contented with things as they are, the history of progress could be written on a cigarette paper. It was the discontent of our ancestors that drove them pioneering out into the world looking for ways to better themselves.

So you see discontent is somewhat of a virtue. What in this great automotive industry do you think is all wrong and what is your suggestion for a remedy? Let's have it for presentation on this page. You may get some interesting answers or sympathy from all corners of the United States.

Regarding the Flat Rate System

EDITOR, MOTOR AGE: Mr. Goodlove's opinion of the flat rate system is not what automobile owners as a whole feel. Ninety per cent of all automobile owners want to know what a job will cost them before they sign their name to a work order. Who can blame them? I say that when a contact man tells his customer what the job will cost, and this customer comes for his car, pays what he was told the job would cost, and his car is O. K., then this customer is satisfied. He doesn't care

how much profit they made. He knew what it would cost before he left his car for work.

In order to work the flat rate system with success, a shop must have first-class equipment and a good contact man to meet all customers and tell them what is wrong with their car. The contact man should be a first-class mechanic, so he will know when one job will cost more than another. Then he can give the customer a price for that job, and that is what a customer wants to know.

In any dealer will equip his shop and train his men, he can use the "flat rate system" with success. He will have a larger number of satisfied customers, which means more money in his pocket.

The following example will illustrate the need for proper equipment:

Mr. C. drives his car into a garage to get the valves ground and carbon removed. Some of the valves are very badly burned, and much time is required to grind them to a proper seat. When Mr. C. comes for his car they show him the bill, which is $18.50. They tell him this: "We are very sorry your bill ran so high. Your motor had four valves badly burned; we didn't have reamers and facers to fix them, so had to take up much more time grinding them."

Should a customer suffer for this shop being poorly equipped? I should say not!

The flat rate system is the best for dealers and customers, and all dealers will have to come to it or go out of business. The customers control the dealers' bank account, and they want to know what a job will cost. We must come to a flat rate system—unless we want to go against our customers' demands. W. C. Byrd, Osmond Barringer Co., Charlotte, N. C.

A Dealer Who Has Been in Business for 20 Years Tells How He Would Solve the Used Car Problem

EDITOR, MOTOR AGE: Of the various plans mentioned to solve the used car problem, I like that of Mr. Brooks, appearing in MOTOR AGE Dec. 1, more than any other proposed.

I will offer some ideas that I have on this problem, after 20 years in this line.

I would have the dealer representing the car sold to the Used Car Co. furnish the repairs and do the work of rebuilding the car, putting it in first-class condition. I say this because I know my men working with my line of cars—no man of which has been with me less than five years, and some of them eight years—can do this better and quicker, and so, of course, cheaper than any man not in garage work. The factory man very probably does not do much repair work, but always puts in new parts, when adjustments of parts is often all that is necessary.

Dealer Guarantees Car

I would have the dealer guarantee the used car and build a reputation for the Used Car Co. that would bring buyers to it because they would know they would not be cheated when they bought a car there.

As for our own cars, we have no trouble along this line; but when buyers of used cars, who have been robbed in buying a used car that should have been junked, come in to see us about a used car, we have a hard task to make them see that we are offering a car properly rebuilt and that it will give good service.

This dealer must sell both parts and labor at cost to the Used Car Co.; in this way the Used Car Co. can soon become famous for delivering cars that will give such service as to make the buyer a booster for the used Car Co.

Have Manufacturer Invest

As to financing, I would have the manufacturer invest in the company in each town the amount of deposit he has from the dealer in that town, and the dealer take stock in proportion to the amount of business he is doing. In this way the Used Car Co. would have sufficient capital to function properly.

I would not have a manager from my own town. We have no fit man to appraise used cars outside the old dealers, and we are trying to get out of the used car business.

I would not have much national advertising, but would have the dealers do a great deal of advertising. I would have the dealer allowed a regular sales commission for any prospect that he took to the Used Car Co. and sold a car, making settlement and all in connection with it; but nothing allowed him for recommending the sale or just boosting it.

It is a bright suggestion of Brooks that the various units of the Used Car Co. keep posted as to what the other units have, exchanging cars where one model sells better in one place than another; and I would have the dealer furnish drivers for making this exchange.

The Used Car Co. should not recommend repairing a car that ought to be junked, but should have a commodious parts room, and the old cars should be taken down, parts tagged and placed on sale. This business is a wonderful asset. We usually make 100 per cent on the parts within one year and still have parts left.

Buy 'Em Right

However, with all these plans functioning nicely, the dealer who does not know costs of doing business, now relieved of the used car, get cash for his new car, and, being a price-cut artist, will cut the prices worse than ever, this causing a worse situation than the used car. If the dealer did not pay more than the old car was worth, he would not need the Used Car Co.

Mr. Reeves tells it all when he says, "Buy 'Em Right."

There will be a great improvement when the manufacturer or distributor refuses to contract with a dealer that has no showroom or garage equipment. Also when they do not allow dealers to sell cars in open territory at any price they see fit.

Varying Discounts

Only this week a distributor for an old factory whose stock sells higher than any one's on the exchange, sold and delivered here a job at 15 per cent discount from list. The buyer knew this was open territory and called one distributor 40 miles away and had proposal of delivery at 10 per cent off. Then the buyer called another 50 miles away, got a 15 per cent discount and bought. This factory has tried at times for 18 years to have us sell its products, and there was a time 12 years ago when we would have taken it on but for this having been done here by them for 20 years. There are perhaps 15 of their jobs in this country. The factory we took on in 1911 has now 850 in this country.

It may be "Awful, Mabel," but I would like about 90 per cent of the factories to go out of business. The remaining could supply the demand with better products and at lower prices because of increased production by them. From 1912 to 1914, $75,000 was lost here in the automobile business, and then for a few years the dealers surviving (they made nothing during this time) made money, but again the new crop of would-be dealers came in with money they did not earn and that had never been spent, and the old dealer has his troubles again. W. L. Wasson, Lincoln, Ill.

Road Inspection Service for Trucks

PREPARATIONS for a substantial increase in service on motor trucks, especially during the winter months, are being made by the Denver branch of the International Harvester Company of America.

"More thorough service means still better results from the International trucks in use in our territory," explained Manager A. B. Hancock of the truck department, "and this greater satisfaction among our truck owners is bound to lead to more truck sales.

"We are issuing a free inspection policy on all the trucks we sell, this policy to be good for the life of the truck. Whenever an owner brings his truck to our service station it will be inspected carefully without charge. And this inspection is careful and thorough, as is shown by the fact that we hold strictly to a schedule of inspecting only four trucks a day. In addition to this plan, we keep a special man on the road inspecting our trucks throughout Colorado, where we have 275 trucks on our records.

MOTOR AGE

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Some N. A. D. A. Plans

A CRITICISM of the new N. A. D. A. membership plan is heard frequently in this form:

The plan of restricted membership at a higher cost and increased service will ignore one of the most useful features of the N. A. D. A. work in the past: specifically, the service to local associations.

While this appears to be a just criticism, according to the published announcement of the new organization plan, it will be apparent from later announcements that this important work is not to be given up. While the association leaders believe that their mission is to be chiefly in giving an exceptional service to the member dealers, they plan to continue the clearing house for the local associations and to make this department even stronger than it has been in the past. The continuation of this work will give to the small dealer, the member of a state or local association, probably more service than he has been receiving in the past, because the association as a whole will have more service to give.

It also is the plan of the association to extend its publicity work in the interest of the automotive dealer business in general. This part of the work will include the gathering of information that will be helpful to the new dealer in warning him of the pitfalls that lurk behind the scenes in this new merchandising, and bringing the novice to see that the difference between the factory price and the retail figure is not all profit.

This on belief on the part of many new dealers has in itself been the cause of many failures. It looks so easy to buy a car of the factory for 20 per cent off list and then sell it for list price and put the difference in pocket. Too late many of these aspiring merchants learn that there are expenses connected with automotive merchandising and that percentages off list are not as great as were expected.

This belief on the part of many new dealers has been partially covered by the N. A. D. A. in the past, but the work was hampered by the fact that so much work of a primary character had to be done for the new members who, in most cases, were new dealers.

One of the chief reasons for the change of the membership plan was a realization that the association work was the same thing over and over, and there was not time or means for advanced work. Now that there is to be a two-year experience clause in the membership requirement, much of this work will cease to be necessary in the individual cases, but can be conducted by a general educational scheme with probably a better effect.

More Care With the Electric System

PROBABLY nothing is more puzzling to the car owner and to many service department mechanics, than trouble with the electric system when it occurs on the modern motor car. Even the most proficient electrical repairmen often are puzzled over a certain condition that might spring up in the car's electric system.

Visible defects ordinarily are easy enough to remedy, but things like intermittent short circuits are hard to find and very often are caused by careless installation at the factory. It frequently means that a mechanic must go over the entire electric circuit before the trouble is located, and it is not uncommon to have to remove many wires to discover a chafed section or broken wire.

The practice of running wires in metal conduits is to be commended, as there is little or no chance for such an inclosed wire becoming chafed or broken. Troubles with such installations usually will be found to exist only at points of connection, like junction boxes, switches, fuses, etc.

It is certain that if every maker will see to it that the wiring on his car is carefully installed, there will be less complaint at service departments. Some makers are too skimpy with the length of wires furnished, with the result that such wires easily pull out of junction boxes. Not long ago a car was driven during the daytime and the owner, after a time, detected an odor of burning insulation. Investigation showed that the wire going from generator to storage battery had pulled out of the junction block located on the dash. Further examination showed that the end of the wire had only a very small part of the insulation rubbed off to fit into the junction block. The result was that the small binding screw could not get a good hold on the wire, especially with the end of the insulation butted against the block. The car owner had not watched the ammeter and did not notice when the hand came to zero. The generator, of course, burned out. The car was only three weeks old and the dealer finally had to make good on a new generator.

Certainly the simplification of chassis wiring is something which the owner, as well as the service man, would welcome. But much good could be done if more attention were paid at the present time towards mak-

ing sure that all connections will be permanent and that wires are not so located that they might become chafed or broken.

Careful Advertising

THE announcement of so many price adjustments leaves us with a hope that dealers and automotive sign writers generally will be a bit more careful in their copy than they were last summer.

It often has been remarked that Motor Row in several cities too strongly resembled the questionable retail clothing district last summer when so many price adjustments were made. The signs were too violent in their wording. "Another Slash," "Deep Cuts" and similar phrases were used to attract the eye and attention of the public. The atmosphere was one of a "cut price" rivalry and one looked about to see the "Fire Sale Reductions" that belong with these extravagently worded signs.

Automotive merchandising has always had a good deal of dignity and it is a serious situation if we have not built up a class of merchants who can meet a situation like this without dropping into the language and customs of the "puller-in sample clothing house." Of course, we would announce the reduction in price, but there is no use going to the very slums of merchandising to get the phrases to do it with. Let us retain some of the dignity that should go with the handsome article of merchandising that we are selling.

A Long Hard Pull

AS this is written, the pages of the daily and weekly newspapers are filled with reviews of the year just gone, and practically all of these say that we have turned the corner and that better times are coming.

We hope and believe that this is true. But there is going to be no waving of a fairy wand, good business immediately taking the place of the more or less dark days that you have been experiencing. It is going to be a long, hard pull and you will need all of the strength that you have gained by the galley slave days of the period we are leaving. The return to prosperity of your own business and that of your neighbors will balance the effort you put in to reach the high levels.

For more than 25 years the automotive industry has responded when the road was clear. It is not yet clear, but the fogs and mist of pessimism are lifting and good times loom ahead if we move cautiously and steadily. Each must do his part, for the industry must move as a whole.

Should Barnum Be Immortalized

THE nativity of the motor car dates back some twenty-five years. In 1908 the total number of automobiles in use in the U. S. did not exceed the 1920 weekly output of one of the famous popular priced American cars. The amount of talent engaged in the maintenance and merchandising of these cars and accessories, and specialties for them, was very limited. Mechanical skill was at a premium. The ability to drive a car was a mark of accomplishment. The automobile of those days was a veritable "babe in the woods." The owner's general lack of knowledge concerning the functioning of various of the component units and accessories of his horseless carriage was sometimes capitalized by the unscruplous.

With the rapid strides made in the production of automobiles has come an increased field for the distribution of merchandise and automobile specialties of doubtful character. The status of these articles is not difficult to define. A fair knowledge of the laws of logic and elementary mathematics are the requirements necessary to draw the definition. Invariably these articles are presented with the most alluring advertising text. The claims of the makers of certain patent medicines pale to insignificance when one reads the circulars of some of the "automotive patent efficiency increasers."

It is really surprising to see so-called trade periodicals admitting the advertising of such spurious preparations and devices. The dealer who stocks this stuff is doing himself and his customer an injustice. The fact that he can dispose of these items is an admission of lack of education of both dealer and customer.

If the dealer, the publisher, and the car owner would pause and think, they would realize that genuine revolutionary improvements need not go begging for recognition. A sense of logic would tell them that the inventions that really increase efficiency or performance are sought by well-financed and well-managed organizations that already have a reputation for honesty. They would realize that the words of a noted showman are the only grounds for existence of these irresponsible concerns.

The Used Car Solution

IF the manufacturers will live up to the announcements of their organization spokesman, the used car problem is settled. In a recent bulletin on this subject, Alfred Reeves, general manager of the N. A. C. C., cited 22 helps for the used car situation. The first of these was:

"Make fewer and better cars."

This sounds as if Mr. Reeves has reached the true solution, and if this was carried out by the manufacturers, there would be little use for the other 21 reasons, most of which are familiar to all persons who have read or talked about this important subject.

But, of course, the manufacturers will not follow this advice literally. Human nature is different from that. Each will think that it applied to the other manufacturers and that his is the better car and so he will go gaily ahead and manufacture his particular vehicle. As a result, only the financial pinch that comes with an inability to market a car will have effect with the manufacturer. It is safe to say, however, that some manufacturers will be less free with advice as to quick trading than they have heretofore been. The manufacturer of a car that stands very high in popular favor, has often advised his friends that they should turn in these cars after two years driving and get a new one. When one of the owners who was so advised began to feel the financial pinch that has reached so many men since the war, he looked about for another car. When asked why he was going back on his long time favorite, he replied:

"Why Mr. President told me himself, that his was a two-year car and I cannot afford such a luxury now."

There is a practical application of this quick trading advice, whether it comes from manufacturer or dealer. There probably will be many more reactions of the same sort from men who have been poorly advised.

Then too, manufacturers of automobiles must learn to produce in response to the demand. The time is past when they can force their merchandise on the market. Many of them have found this out during the year just closed, but they had best make this lesson a very lasting one. The opportunity for the good dealer and distributor to speak to the factory has come, and if he values the future of his business, he will not be slow to speak.

Show to Have Surprise in Values

New Prices, New Models, to Be Sensation of N. Y. Show

Confidence of Manufacturers in Preparing for Business Is an Inspiration to Dealers

NEW YORK, Jan. 3—Several of the price reductions predicted for the turn of the year already have been made, but more will follow, coincident with the opening of the New York show Saturday. Some of these reductions have been discounted, but others will be more or less unexpected. It now seems probable that the revision will be more general than had been anticipated and that companies which had intended to stand pat will be forced into line to meet competition. As a consequence, predictions are unsafe. New prices are a closely guarded secret until executives think the psychological moment has arrived to spring them.

New prices will be one of the sensations of the show. Another will be new models or old lines revamped to give purchasers improvements or comforts they have not had hitherto. The two combined will present motor car values not duplicated since the war and in some cases never equalled. Because of changes and improvements in equipment, it is practically impossible to compare present values with those of prewar days in individual makes.

Confidence of manufacturers that the new values will result in orders is evidenced by the fact that most of them have been assembling parts for complete units since current sales began to decline a month ago. This has been reflected in the unexpectedly large volume of business given parts and accessory makers in December. It is expected their sales for the last month of the year will exceed those for November.

A remarkable evidence of the stability of the industry in the past year is found in the fact that sales by members of the Motor and Assessory Manufacturers' Association for the last 10 months have been in virtually the same volume each month. Sales in March jumped to $20,000,000 from half that amount in February. They rose to $26,000,000 in April and May. They fell at $22,000,000 in June, while in July, August and September they were $23,000,000. In October they dropped to $22,000,000, and in November to $19,000,000. They probably reached the $20,000,000 mark again in December.

With December estimated, this would make a total for the year of approximately $243,000,000. When the year began, however, all of the vehicle manufacturers were loaded up with enormous inventories, so that only a part of their requirements for the year came from releases or new orders.

While the lower prices and the higher values which will be offered at the New York show will usher in an era of keener competition, it is generally believed prices will have been stabilized for a considerable period. This would hearten the dealers, who would be able for the first time in a year to give prospective purchasers the whole-hearted assurance that no further cuts were in prospect.

The final estimate of production of passenger cars and trucks by American manufacturers in 1921 has been reduced from 1,700,000 to 1,680,000.

A. A. Ryan to Back Frontenac Car Designed by Chevrolet

New York, Jan. 3—The new Frontenac car designed by Louis Chevrolet, which will be shown for the first time at the Hotel Commodore next week, will be built by a new company backed by Allan A. Ryan and a syndicate of capitalists. Beyond the fact that Ryan is the dominating figure in the Stutz Motor Car Co., there will be no connection between the two corporations, it is asserted.

Detailed plans for the new company have not yet been worked out, but it will be a reorganization of the old Frontenac Motors Co., incorporated, some time ago by Chevrolet. Negotiations have been completed for the purchase of a plant in Indianapolis large enough to permit quantity production of the new car, which is described elsewhere in this issue of MOTOR AGE.

It is understood that the president of the company will be a man widely known in the automotive industry. Chevrolet personally will have a prominent place in the organization. The Frontenac organization will be entirely distinct from that of Stutz, but it is possible many of the Stutz dealers may take on a new line in addition to the old. It is planned to begin production in the near future.

NEW USED CAR METHODS

Buffalo, Dec. 31—Resolutions to abolish present methods of dealing with used cars, and to establish a national company for their disposal, were approved at a meeting of the local association of automobile dealers at the Lafayette hotel last night. Copies will be sent to the manufacturers by the dealers in charge of sales in Buffalo territory and to the National Automobile Chamber of Commerce.

GRAY CAR TO SHOW

Detroit, Jan. 3—Gray Motor Corp. will exhibit its new car at New York in the Hotel Commodore lobby during the automobile show. This is the car produced by Frank L. Klingensmith and F. F. Beall to sell for less than $500.

1921 Production Figures Show Industry's Advance

Wholesale Value of Cars Considerably Lower Than in 1920—30,639 Vehicles Exported

NEW YORK, Jan. 3—Careful estimates made by the statistical department of the National Automobile Chamber of Commerce show that the production of cars and trucks in the United States in 1920 was 1,680,000, a decrease of 24 per cent from the 1920 production. The passenger cars built numbered approximately 1,535,000 and the trucks 145,000.

The wholesale value of cars and trucks produced is estimated at $1,222,350,000, a decrease of 45 per cent from the 1920 wholesale value. The average wholesale price of the motor cars sold in 1921 was $702 as compared with $897 in 1920 and $968 in 1921.

The National Automobile Chamber of Commerce estimates that there are registered in the United States approximately 10,000,000 cars, of which 1,000,000 are trucks. Farmers own 2,850,000 motor cars and 150,000 trucks. It is estimated that farm products hauled by motor transport for the year total 134,400,000 tons. There are now in operation about 20,000 motor buses, 1,500 public motor express lines. It is figured that 6,000,000,000 passengers are carried annually by motor car and 1,200,000,000 tons of freight by motor truck. The number of street railway lines now using motor buses is 35 and the number of steam railroads using motor trucks with flange wheels is 12.

Gasoline production in the United States in 1921 was 5,36,014,000, an increase of 9.8 per cent over 1920. Gasoline consumption increased 5.9 per cent.

Tire casings produced last year numbered 19,379,000 and inner tubes 24,157,000.

The value of motor vehicles and parts exported in 1921, including engines and tires, was 102,945,610. Motor cars exported numbered 30,639.

INDUSTRY'S LARGEST SHIPMENT

New York, Jan. 3—What is said to be the largest single delivery of automobiles ever made to a retail dealer will be sent this week to Earl C. Anthony, Inc., of Los Angeles, by the Durant Motor Car Co. of New York. The shipment will consist of 500 Durant cars carried in a single train of 100 steel freight cars. The freight charges will amount to $66,660, and the Durant company has received a draft for $335,500 from Anthony to cover the transaction. Production at the Long Island City plant of the Durant company is now 75 cars a day.

New Prices Feature New Year

PAIGE REDUCES PRICES

Detroit, Jan. 3—Price reductions announced by the Paige-Detroit Motor Car Co. on all its models range from $170 to $680. The prices on the 6-44 line are:

	Price Old	Price New
2-passenger touring	$1635	$1465
5-passenger touring	1635	1465
Coupe	2450	1995
Sedan	2570	2245

The prices on the 6-66 models are:

	Price Old	Price New
4-passenger touring	$2975	$2245
3-passenger touring	3295	2495
7-passenger touring	2875	2195
Coupe	3755	3100
Sedan	3830	3155

The prices of the new Jewett car, the light six line which will be produced as a companion to the Paige, will not be announced until a meeting of Paige dealers at the New York show.

STEARNS REDUCES PRICES

Cleveland, Jan. 3—The F. B. Stearns Co. has announced reductions on its models for 1922. The prices are as follows:

	Old Price	New Price
Roadster	$2450	$2250
5-pass. touring car	2450	2250
4-pass. militaire	2475	2275
7-pass. touring car	2675	2450
Coupe	3400	3150
Coupe brougham	3600	3450
Sedan	3700	3450
Limousine	4400	4150
Town car	4400	4150
Landaulet brougham	4400	4150

The company provided fabric tires for the prices quoted in 1921, while in the new year it will equip the cars with cord tires at the lower prices.

APPERSON LINE LOWER

Kokomo, Ind., Jan. 3—Sharp reductions in prices will be announced at the New York show by the Apperson Bros. Automobile Co. The prices are:

	Price Old	Price New
4-pass. Sportster—open	$3000	$2620
7-pass. Touring	3250	2645
4-pass. Tourister—open	3500	2995
4-pass. Sedanette	4500	3895
Sedan	4500	3995
Limousine—sedan	4700	4195

The Apperson line will be unchanged mechanically, but two new body models will be added. They will be known as the "tourequip," listed at $2995, and a four-passenger "tourister" with special equipment, listed at $3245.

TRANSPORT REDUCES PRICES

Mt. Pleasant, Mich., Dec. 31—The Transport Truck Co. will begin the year with a new line of specialized trucks at reduced prices based on present costs. The company will feature six models, or two more than it has had previously. The line includes: model 15, "rapid transport" 1-ton, equipped with pneumatic tires, at $1295; model 25, 1½-ton, at $1495; model, 35, 2-ton, $1885; model 55, 3-ton, $2385; model 60, 3½-ton, $2585; model, 75, 5-ton, $3485.

The old prices on transport models have been: 1-ton, $1395; 1½-ton, $1995; 2½-ton, $2785; 3½-ton, $3885.

The models 35, 55, 60 and 75 all are equipped with drive shaft brake, four-speed transmission and electric lights, bumper, hubodometer and motometer.

HANSON PRICES LOWER

Atlanta, Jan. 1—Hanson Motor Co., Inc., of this city has made reductions on its line as follows:

	Price Old	Price New.
Touring	$1,995	$1,595
Sedan	3,185	2,585
Coupe	3,075	2,475
Sport	2,095	1,695
Roadster	1,995	1,595
7-pass. touring	2,195	1,795

The new Hanson light six, which will be shown at the New York show for the first time, will sell for $995.

OLDSMOBILE MAKES REDUCTIONS

Detroit, Jan. 3—Slight price reductions effective Jan. 1, have been made on part of the Oldsmobile line by the Olds Motor Works. The changes are:

	Old Price	New Price
Four-cylinder sedan	$1845	$1795
Small 8 coupe	2185	2145
Small 8 sedan	2425	2295
Small 8 touring car	1625	1595

No change of price has been made on the large eight line.

GENERAL MOTORS TRUCKS LOWER

Pontiac, Mich., Jan. 3—General Motors Truck Co. made a reduction in the prices of its chassis, effective Jan. 1, as follows:

	Old Price	New Price
Model K-41, 2-ton	$3000	$2775
Model K-71, 3½-ton	4250	3950
Model K-101, 5-ton	4650	4350

Model K-16, which completes the line, remains at its former price, $1495, to which it recently was reduced.

STUTZ LOWERS PRICES

Indianapolis, Jan. 3—Lower prices on its models will be announced at the New York Show by the Stutz Motor Car Co. The prices will be:

	Old Price	New Price
4-pass. touring	$3350	$2990
6-pass. touring	3350	2990
Roadster	3250	2950
Coupe	4800	3990

HANDLEY-KNIGHT REDUCES

Kalamazoo, Mich., Jan. 2—The Handley-Knight Co. announces a new schedule of prices for its complete line, showing an average reduction of about $500 per model. The standard touring car has been cut to $2,450 and the deluxe touring to 2,650. The seven-passenger sedan now sells at $3,750. Two new models, the sedan-coupe, $3,750, and the five-passenger tourer, 2,250, are additions to the line.

ELGIN PRICES DROP

Elgin, Ill., Jan. 3—Effective at once new prices on the Elgin line are as follows:

	Price Old	Price New
5-pass. touring	$1,495	$1,295
4-pass. scout	1,595	1,345
2-pass. roadster	1,595	1,345
5-pass. sedan	2,395	2,195
4-pass. coupe	2,395	2,195

STEWART PRICES REDUCED

Buffalo, Jan. 1—Prices on the Stewart trucks have been reduced as follows:

Speed truck	$1,395	$1,195
1-ton	1,875	1,395
1½-ton	2,200	1,790
2-ton	2,800	2,090
2½-ton	2,950	2,290
3½-ton	3,850	3,090

MAXWELL TRUCK DROPS

Detroit, Jan. 1—All Maxwell 1½-ton truck models have been reduced in price $400, bringing the chassis price down to $932.

CORRECTION

The new price of the Davis 1922 touring car is $1,795 instead of $1,695.

The price of the Hudson 7-passenger sedan is $2,650 instead of $3,250, as printed in MOTOR AGE last week.

FORD DENIES REDUCTIONS

Detroit, Jan. 3—The Ford Motor Co. in a telegram to dealers denies that prices of its cars will be cut around Jan. 1, as widely rumored. The company says: "As there is no foundation for these reports and we are not contemplating any price changes, we have no hesitancy in making a denial of this report."

BUFFALO TO FEATURE SALES

Buffalo, Jan. 4—Buffalo's twentieth annual automobile show will be held in the 74th Regiment armory Jan. 14-21, under the auspices of the Buffalo Automobile Dealers' Assn. Carlton Proctor, executive secretary of the dealers' association, and show manager, said the service phase of motor car merchandising is going to be emphasized as never before at this year's show.

Government Tax Blunder Cause of Lincoln Failure

$4,000,000 Mistake at Time of Refinancing Company Cause of Receivership

DETROIT, Jan. 4—In an order issued by Federal Judge Arthur J. Tuttle here the Lincoln Motors Corp. has been ordered sold Feb. 4. The action followed a request by counsel for Henry M. Leland, president of the concern, who says he has a buyer. Judge Tuttle set a sale price of $8,000,000 on the corporation.

Washington, Jan. 3—An unusual instance of blundering by the government in the realm of taxation is revealed today in the decision Wednesday of the collector of internal revenue reducing taxes assessed against the Lincoln Motor Co. from $4,500,000 to less than $500,000.

It was the action of the government on Nov. 4 last in assessing this tax, which forced the Lincoln company into the hands of a receiver. The collapse of several smaller accessory corporations in Michigan and elsewhere, which were creditors of the Lincoln, and of a number of the distributing concerns, formed in other cities to handle the new car, followed immediately. In all, it is estimated that business institutions of a total capital value of $12,000,000 were involved.

Now, only a little more than a month later, the government has decided it was a mistake, and that the major portion of the tax should not have been assessed.

The action of the government in pressing the tax assessment in November is all the more startling in light of the history of the Lincoln company. The plant was built almost entirely with money advanced by the government, for the purpose of manufacturing Liberty airplane motors. It produced 6,500 of these motors before the armistice, when it was just beginning to reach its maximum of production. When the government no longer needed the plant for its war purpose it was sold to the Lincoln Motor Co., a Delaware corporation.

The sale price represented approximately 55 per cent of cost. The reduced price, of course, was due to the abnormal construction costs prevailing during the war period and the recognized necessity of the material transformation of the property by its purchasers to adapt it to automobile construction.

In effect, the government came along some time thereafter and assessed the plant for purposes of taxation at its full war cost. It denominated as profit the difference between original cost and the subsequent 55 per cent sale price and assessed a tax on this profit at the maximum rate of 80 per cent.

The 1918 tax law plainly intended to provide for this specific situation. It declared in effect that a manufacturer producing materials exclusively for war purposes was allowed to deduct from his income within three years after the war the loss represented by depreciation from the abnormal war cost of his plant.

At the moment when the tax was levied, in November, officials of the Lincoln company were in New York, where they had about closed negotiations for a loan sufficient to carry the company through until spring, when it was believed that reviving business would enable it to carry itself. The immediate effect of the assessment was to destroy the credit of the company. In the face of it no one would make a loan.

MOLINE STRONG FINANCIALLY

Chicago, Dec. 31—Frank O. Wetmore, chairman of the reorganization committee of the Moline Plow Co., in a recent statement said that the company is in excellent financial condition with ample working capital and no current liabilities excepting accrued payrolls and current purchases of material. More than 9 per cent of the creditors have accepted the reorganization and refinancing plan. Serial notes are coming in daily, and soon the plan will be 100 per cent accepted. A new board of directors is in process of formation. The old preferred stockholders will have one director and it is certain that George M. Peck, president of the Moline company and H. S. Johnson, vice president, will be on the new board. Machinery has been purchased and installed and the production of engines for the Stephens car soon will be started in the Moline plant.

MICHIGAN CIRCUIT CHANGES DATES

Detroit, Dec. 31—A change has been necessitated in the schedule of the Michigan show circuit through the determination of Ypsilanti and Ann Arbor to combine their shows in the former city, where it will be held under the auspices of the Washtenaw County Automotive Dealers' Assn. The date is Feb. 1 to 4, in the Apex Motor Corp. building, with O. C. Eckley as manager.

Dates for the Pontiac show, which will also be part of the Michigan circuit, have been set for Jan. 1 to 21, just preceding the Detroit show. This will be under the auspices of the Pontiac Automobile Dealers' Assn., with F. A. Bone, Jr., as manager.

At least two stripped chassis will be shown in the smaller Michigan cities this year, this being the first time that this kind of display has been available. A Buick chassis will be transported from city to city in the circuit upon a specially equipped two-ton G. M. C. truck, the truck being provided by Owen & Graham and Guy S. Garber, distributors. A Nash chassis also will be shown.

REELECT OLD OFFICERS

Seattle, Dec. 31—Unanimous reelection of its officers featured the semi-annual meeting of the King County Automotive Trades Assn. last week. Kenneth McAlpin is president; R. E. Bridgeman, vice-president, and William A. Simonds, secretary.

C. E. Gambill Argues Against Elimination of Distributor

Chicago Marmon-Hupmobile Representative Thinks Middleman Is Economic Necessity

CHICAGO, Jan. 4—The present agitation for the elimination of the distributor in the scheme of automotive merchandising is not economic, according to Charles E. Gambill, the Marmon-Hupmobile distributor in this city. Gambill is one of those who believes the distributor has a proper place in the picture and that to eliminate him will disrupt a well-running plan of distribution.

"The jobber is an economic factor in all other lines of merchandising," said Gambill to MOTOR AGE, "and there is a place for him in this business. If the distributor is eliminated, the factory branch must take his place. So far the experience has been that the factory branch cannot be operated as economically as a distributor's branch. There is history of scores of failures, and during the year just closed we have seen many statements of losses in the operation of branches.

"It is not reasonable to expect at the present rate of salaries paid by the automotive factories, that men can be employed to handle as large a business as a factory branch with as much interest as the man who has his money invested.

"I will not deny that there are bad distributors as well as good distributors. That the bad ones continue in business is the fault of the factory. Is it reasonable to suppose that factory supervision of thousands of dealers will be any better than the factory supervision of a hundred distributors? How can the factory that cannot maintain good distributors hope to maintain good factory branches and dealers, for under the new scheme the dealers would be under the control of the factory?

"We will admit that there is a standard to which distributors should measure. Selling, in the main, is a territorial business. Tastes, habits and common interests of the people make it so. The distributor should by all means have a retail department, and in this department he should work out sales plans for the dealers in his territory; accumulate and distribute financial data for his dealers; he should know them all by name, and hold periodic meetings for their benefit and 'pep' them up into a selling club for his car.

"The distributor does not make a large profit on the cars he handles at wholesale. But the factory cannot put into the work the same human touch as the distributor and his sales staff.

"I think that it will be a backset for the industry if the distributor is replaced by the factory traveler, or the branch manager, because the mass of dealers necessary for the distribution of a car throughout this country is far too great

for one staff to handle, and a salary never put into a merchandising proposition the same interest as returns on invested capital.

"As regards the matter of parts and cars, the factory branch would have to carry a stock of parts and complete cars equal to that of its various distributors, which necessitates tying up considerable capital, which is a financial drain on the factory.

"Every live distributor maintains a highly developed retail sales organization, through which he is enabled to offer seasonable selling advice and sales plans to his local dealers. The distributor must work out policies to meet local conditions, while the factory's policy would naturally be national in scope."

COAST DEALERS TALK EMBARGO

Los Angeles, Dec. 31—Los Angeles motor car dealers are threatening to put a ban on used cars that have seen service any place but in California. Of course, this will not be made to apply to cars belonging to local residents who have used them for a transcontinental or interstate journey, but will apply, if plans mature, to the practice in vogue in the past of eastern residents buying a used car at home, driving it to southern California and disposing of it to a used car dealer upon arrival here. The proposition of an embargo against eastern used cars was broached at a recent gathering of the most prominent dealers of the city and it "went over big." It went over so strongly that the state's motor vehicle department has been asked to check every used car of foreign registration that later is registered in California, and the department has agreed to cooperate to that extent.

FORD PARTS SALES PLAN

Detroit, Jan. 4—The Ford Motor Co. has begun the sale of its genuine parts to all retail stores, automotive dealers, department stores and others under a change in its policy by which it hopes to get much of the business now being obtained by manufacturers of parts which can be substituted for the genuine.

These parts can be purchased from authorized Ford dealers or direct from the factory where contact with the dealer is not convenient, in minimum lots at a 33 per cent discount from the list price. This plan gives Ford dealers a field for wholesale distribution which hitherto has been closed to them under the policy of the company.

ACCESSORIES CREDIT DIVISION

Philadelphia, Dec. 31—The Automobile Accessories Business Assn. is having a credit branch for the benefit of members organized by the president, W. H. Metcalf. The aim of this division or branch will be to protect the members by reducing the number of bad accounts. In this way frequent losses will be eliminated and the equipment dealer's overhead expense reduced, enabling them to do business on a better scale than heretofore.

State Highway Association Asks Higher Automobile Tax

Declares Owners Are Not Paying Fair Portion of State's Road Improvements

WASHINGTON, Jan. 4—Further distribution of surplus motor vehicles, especially five and 10-ton caterpillar tractors, has been requested by the American Assn. of Highway Officials, as a result of resolutions passed at their annual meeting at Omaha, Nebr., early this month. Assurances were given the president and congress that materials and equipment received from the war department have been of incalculable service to the states in the prosecution of their programs of highway construction and maintenance and that they have been used for these purposes and for no other, with the resultant saving of untold millions of dollars to the American people. This expression was made as a result of criticism from certain business interests that the materials thus made available for the public use have been generally mismanaged and illegally disposed of by the states.

The association also went on record in favor of higher taxes on motor vehicles. It was resolved that the association "urge upon all states the fairness and the necessity of collecting an adequate portion of the cost of highway programs from the users of motor vehicles. This fair share is not only the cost of maintenance of modern highways, but includes also a fair proportion of the cost of new construction, because much of this latter cost is due to the necessity of adequately providing for motor traffic. It was recommended that appeals be made to the individual motorists for his support of a policy of providing for a fair distribution of the cost of highway improvement."

It was stated that in most of the states the owners of motor vehicles are paying an insufficient portion of the cost of the state's highway program, as compared to the portion of the cost raised by taxation on general property, despite the fact that the individual owner is always willing to pay his fair share of such cost.

The association indorsed the proposal to establish an advisory board on highway research by the National Research Council. The organization pledged itself collectively and as individuals to use its best efforts to speed up the properly planned elimination of grade crossings.

MAIBOHM TROUBLES CLEAR

Toledo, Jan. 3—The public sale of Maibohm Motors Co. plant at Sandusky, O., has been postponed indefinitely, but negotiations for a private sale are expected to be consummated soon. Approval of the court will be asked for such a plan. The general reorganization plan will be adhered to, it is asserted, except that a Detroit concern now operating there will bring in new money and organization and continue the Maibohm production along with its other manufacturing interests at Sandusky. The Detroit company desires to take advantage of economies of manufacture offered by the smaller city.

Chairman E. G. Kirby of the creditors' committee said the new plan was looked upon very favorably. Creditors would be granted preferred stock in the Detroit company to the amount of their claims. He said most creditors would prefer to have a new management take over operations. Details are being rushed so that announcement may be made at the New York show.

FITZGERALD INJURED

Atlanta, Ga., Jan. 3—W. B. Fitzgerald, formerly secretary of the Atlanta Automobile Dealers' Assn. and one of the best known automobile men in the state, was critically injured Wednesday, Dec. 2, in an automobile accident. While adjusting a tire on his car Fitzgerald was struck by a skidding truck and crushed against the side of his own machine. He was taken to a local hospital, where his condition was reported as critical.

COLUMBUS SHOW DOUBLE AFFAIR

Columbus, O., Dec. 31—The annual Columbus automobile show will be held at Memorial hall, Feb. 2 to 9, inclusive, under the auspices of the Columbus Auto Dealers' Assn., a new organization formed by local agents and distributors. The former shows were given by the Columbus Automobile Show Co., which was reorganized in the above named association. F. E. Avery is president; I. P. Madden, vice-president; R. H. Mitchell, secretary, and A. B. Coates, treasurer and manager of the show.

The plans provide for both an open and an enclosed model show. Starting Feb. 2, the open models will be exhibited for three days. Over Sunday the show will be changed entirely and only enclosed models will be shown.

AN INTERVENING PETITION

Toledo, Jan. 3—Lloyd T. Williams, of the firm of Brown, Geddes, Schmettau & Williams, attorneys here, filed an intervening petition in the Willys corporation proceedings in Federal court here Dec. 27 on behalf of the United States Light & Heat Co., Niagara Falls, N. Y. In the petition the battery company asks that the receivers be required to accept payment of $802,153 in preferred stock of the United States Light & Heat Co. to cancel a note.

D. H. Kelly, vice-president, was here last week in conference with attorneys. Hearing has been set for Jan. 9.

DELUXE WAREHOUSE DISTRIBUTOR

Seattle, Jan. 3—The Paragon Tool Co., of this city, has been appointed warehouse distributor for the DeLuxe lightweight gray iron pistons, covering the Pacific northwest. The manufacturers of DeLuxe pistons are establishing a chain of warehouses, which will cover the entire country.

LOWER HAYNES PRICES

Kokomo, Ind., Jan. 3—Price reductions on several of its models will be announced at the New York show by the Haynes Automobile Co. The prices follow:—

Model 55	Old Price	New Price
5-passenger touring	$1785	$1595
Roadster	1835	1645
Coupe—(new line)		2295
Sedan	2835	2595
Model 75		
7-passenger Touring	$2485	$2395
4-passenger Tourister	2485	2395
Speedster	2685	2595
Brougham		3095
Sedan	3485	3395
Suburban		3395

DROP IN NASH PRICES

Kenosha, Wis., Jan. 3—Price reductions ranging from $155 to $305 are announced by the Nash Motors Co. on all models in its new six-cylinder line. No price changes are made on the four-cylinder line. The prices are:

	Old Price	New Price
5-pass. touring car	$1,545	$1,390
7-pass. touring car	1,695	1,540
7-pass. sedan	2,695	2,390
Coupe	2,395	2,090
Roadster	1,525	1,360
4-pass. sport	1,695	1,545

The price on the new four-cylinder taxicab has been reduced to $1,395.

DENBY TRUCKS LOWER

Detroit, Jan. 1—Effective Jan. 1, 1922, the following list prices apply on Denby trucks, f.o.b. Detroit, for standard chassis with seat. War tax is additional.

	Old Price	New Price
Mod. 31, ¾-1¼-ton	$1,625	$1,485
Mod. 33, 1½-2-ton	2,300	2,145
Mod. 34, 2-ton	2,600	2,395
Mod. 35, 2½-3-ton	.....	2,795
Mod. 27, 4-ton	4,200	3,895
Mod. 210, 5-ton	4,850	4,295
Mod. 214, 7-ton	5,500	4,945

FORD SALES AHEAD OF 1920

Detroit, Jan. 3—The Ford Motor Co. states that its sales for 1921 will run about 100,000 ahead of 1920. This figure was reached by Dec. 1, and the total for the year is not expected to show much deviation. Production in 1920 was 1,023,553.

There will be no heavy inventory of complete cars carried over the winter as was the case last year.

NEW STEVENS-DURYEA MODELS

Chicopee Falls, Mass., Jan. 3—Stevens-Duryea, Inc., is bringing out three new models, a roadster, a four-passenger sedan and a six-passenger sedan. The four-passenger sedan is semi-collapsible, the rear part being of leather, with a beam-ceiling effect inside, and of owner's drive design. The six-passenger sedan resembles the vestibule limousine, but is built on more compact lines. It is hoped to bring these cars to the production stage within the present month.

VELIE WITH OWN ENGINE

Moline, Ill., Jan. 3—The Velie Motors Corp. is now in production on the new model 58, which has a 115-in. wheelbase, is equipped with Velie built six-cylinder engine with overhead valves. The entire factory production will be devoted to this one model, the four model styles being touring, sedan, coupe and roadster.

TOURISTS' CONVENTION

Minneapolis, Dec. 30—A "tourists' convention," where tourists will have opportunity to tell highway promoters their desires as to routes and markings, and where manufacturers and all interests may confer with highway associations and tourists, for mutual advantage, is to feature the annual convention in 1922 of the Associated Highways of America. This convention will be held in Minneapolis, probably in August.

Not more than 10 per cent of car owners are actually tourists. One purpose of the tourist feature of the convention is to find out why comparatively few motorists tour, and to hear plans for making tourists out of the 90 per cent.

HONOR PROPS AT DINNER

Muncie, Ind., Dec. 30—Despite sleet-covered roads, 105 automotive men from the eighth district and adjoining counties gathered here Dec. 22 as guests of the Muncie Auto Trade Assn., at a dinner in honor of J. Cooper Props, new president of the Indiana Automotive Trade Assn. Props is the oldest automobile business man in Delaware county and last year, as director for the eighth district, was the only director to completely organize his district.

BAN ON ALCOHOL

East Liverpool, O., Jan. 4—Radiator alcohol and denatured alcohol used for other purposes should be sold under provisions of the poison law, according to direct advice received here from Attorney General John G. Price, of Columbus, in reply to an inquiry proposed by T. C. Flick, a member of the national legislative committee of the Ohio State Pharmaceutical Assn.

The decision has created quite a stir among the distributors of these alcohols. In part the decision says:

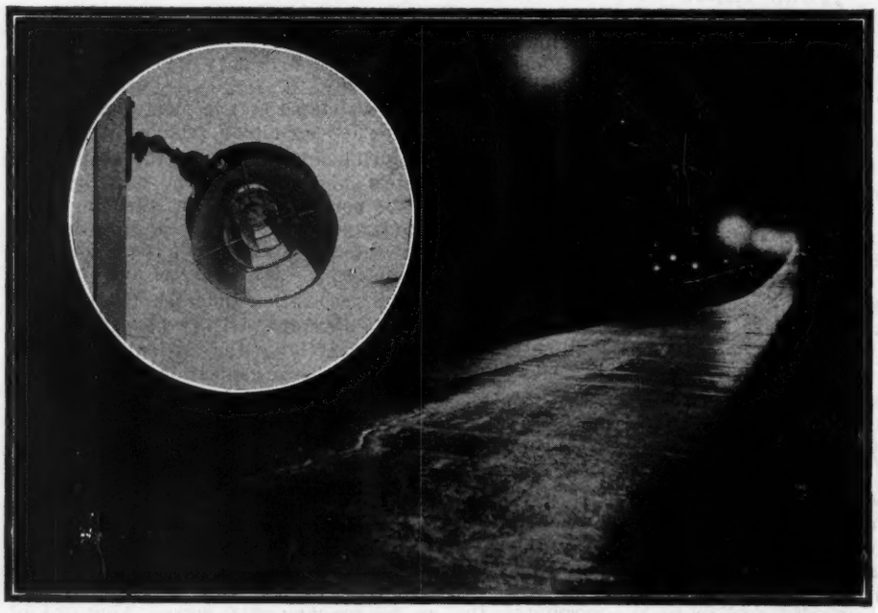
"The public must be protected against the ease with which these alcohols are sold and the carelessness in advertising, sale and delivery.

"The law should be enforced on all dealers, whether they be druggists or garage filling stations. The public must receive this protection the same as it receives protection in the distribution of all other virulent poisons."

DEALERS STUDY TRADE-INS

Boston, Dec. 31—Some of the dealers in Boston are now giving their attention to the used car situation, to see if some means cannot be arranged whereby the trading allowances may not be made more uniform. A committee consisting of George B. Kimball, of the Henley-Kimball Co., handling the Hudson and Essex lines; Joseph S. Donovan, Studebaker distributor for Boston, and C. P. Rockwell, New England distributor for Nash and Lafayette cars, is handling the matter.

Highway Illumination Suggestion for Combating Headlight Glare



A SECTION of the new Schenectady-Albany Highway is being lighted by a new parabolic nest highway lighting unit using 270 candlepower with a 300-ft. base. The illumination of the road by this method is sufficient to permit night driving over this section without the use of the car's headlights. This experimental stretch of road was recently demonstrated to 300 members of the New York State Automobile Assn. by the General Electric Co., installers of this equipment

Plants Ready for Heavy Production

Willys-Overland Frankly Tells of Year's Struggles

Vice-President C. B. Wilson Recites Industrial History and Predicts the Future

TOLEDO, Dec. 31—"The Willys-Overland Co. does not have to submit to any unfair proposition to take care of its financial requirements," declared Vice-President Charles B. Wilson, in a talk to members of the Toledo Chamber of Commerce at a luncheon recently.

"Many other concerns have come through this period only after having been forced to accept almost disastrous plans for their financial rescue. But there need be no uneasiness about our position."

Wilson told the Toledo business men in terms more frank than any other Overland official ever used what the actual status of the company is and how it has come through the business of the last year or more.

"Like many other industrial plants, we inherited a lot from the war period," he went on. "We were over-officered. We had everything from the general right down to the sergeant, and there was plenty of passing the buck.

"It was a hard task to show the big executives that it was time for them to get to work. But we did that; we weeded out surplus officials, and we have our house in order.

"We are looking forward in 1922 to one of our steadiest and most prosperous years. This statement is not based upon idle talk, but upon contracts signed with dealers which call for delivery of 70,000 cars in 1922.

"We are in shape to start Jan. 1 to build up our working organization so as to get into maximum production as soon as possible and will try to reach the peak production not later than March 1.

"The machinery is in order, the department heads are working together, and we believe we have nearly 100 per cent cooperation in the whole working force."

The Overland is now working about 6000 men, will close a few days for inventory, and is expecting to have 8000 men at work by Jan. 15, it has been announced.

In March, 1920, the Willys-Overland Co. had notes payable of $34,000,000, and today the notes payable have been reduced to $18,250,000. On May 31, 1920, accounts payable amounted to $13,600,000 and today they stand at $2,150,000.

The inventory in the spring of 1920 stood at $46,100,000, of which experts determined that less than $5,000,000 worth was in obsolete or surplus materials. Today the inventory is $19,000,000, and the surplus and obsolete material is being consumed at a rate which will see its end by April, 1922.

In July, 1920, the company had material purchase commitments of $63,000,000. They have been reduced to $7,000,000 today without any lawsuits and with maintenance of goodwill of most of the vendors.

Stocks of cars on hand indicate that the factory will have to get busy in the early months of the new year. Branches had 8476 cars on hand Jan. 1 this year, and now they have 5467 cars. The 4000 dealers had on hand Jan. 1, 13,807 cars, and today they have only 8298 cars. These are all included in inventory figures for the company.

The company has recently revamped its sales organization so that now it directly controls more than 80 per cent of its dealers. Nearly 800 new dealers were added in December and the latter part of November.

S. A. E. DINNER SPEAKERS

New York, Dec. 29—Arthur Richmond Marsh, president and editor of the "Economic World," a former president of the Cotton exchange and prominent in cotton activities, will be the principal speaker at the annual dinner of the Society of Automotive Engineers to be held at the Hotel Astor on Thursday evening, Jan. 12. His talk will be along economic lines and will deal particularly with the automotive industry.

C. F. Kettering, past president of the society, will serve as toastmaster. Addresses will be made by David Beecroft, retiring president, and B. B. Bachman, president-elect.

SERVICE ASSOCIATIONS TO MEET

New York, Dec. 31—The third annual convention of Automotive Service Associations will be held in New York City on the evening of Jan. 13 at the Automobile Dealers' Assn. headquarters, 1845 Broadway. Delegates from about 15 associations are expected to attend. As this convention is held during the New York show week, the attendance will be well over 100.

PILOT TO OPEN BRANCHES

Indianapolis, Ind., Dec. 31—The Pilot Motor Car Co. of Richmond, according to information made known here today, is preparing for the opening of branches in Chicago, New York, Cleveland, Kansas City, Pittsburgh and San Francisco. These branches will be under the direct control and supervision of the main offices at Richmond. Each branch will organize the retail territory contiguous to it.

WAYNE WHEEL ASSIGNS

Buffalo, Dec. 29—A voluntary petition in bankruptcy has been filed in Federal court here by the Wayne Wheel Co. of Newark, N. Y. Liabilities are placed at $122,960 and assets at $182,424.

Industry Breasts Barrier for Start of 1922 Schedule

Factories in Detroit District Ready for Business at Opening of New Year

DETROIT, Dec. 31—Holiday week, with many of the plants down for inventory, finds the industry at its lowest production mark since 1920 but preparing to start off with a very decisive spurt immediately after Jan. 1. Many plants have been working during December preparing a stock of complete units in anticipation of a heavy early spring demand.

There has been no stocking of complete cars by dealers this year in anything like the usual proportion, and this is expected to mean a heavy production pull at the factories. Dodge, assembling about 150 cars a day, has been building units for 450 cars and storing the surplus in anticipation of a 600 daily production schedule in January.

Earl Motors is rushing equipment for the new models to build upwards of 2000 in January.

Ford Motors will resume its heavy production Jan. 3. Men have been ordered to report back on that day and at the offices orders are declared to be consistent with the usual season demand.

General Motors units have about outlined the schedules they will proceed upon for the early months.

Factories bringing out new show models are rushing work in preparation for orders on the new vehicles. This list will include probably a majority of companies in the industry, making it a very busy season in the Detroit district, but a business of preparation rather than fulfillment.

Enclosed cars at prices not far above open models promise to be the feature of the national shows this year. Detroit will be represented by several manufacturers breaking into this class, the first of whom was Essex Motors. The new enclosed car has a soft padded top with glass the principal constituent of the side structure. A strong bid for enclosed car business, particularly from persons in professional life, will be made with the new models, and their appearance promises to create somewhat of a sensation.

JUDGE CRITICIZES OFFICERS

Indianapolis, Dec. 31—Prohibition officers who go beyond their authority in seizing automobiles of alleged "booze runners" were severely criticized by Judge Anderson in Federal Court here recently in the proceeding to dispose of 99 automobiles which have been seized from alleged violators of the prohibition laws.

GMC Starts New Year Clear of Committments and Strong

Corporation Officials Optimistic of 1922 Sales; Cadillac and Buick Expect Capacity Production

NEW YORK, Jan. 3—Virtually all the units of the General Motors Corp. will start the new year with their books clear of contracts. Large sums have been spent in the past year in the cancellation of contracts on a basis entirely satisfactory to the persons supplying material, and the equitable policy adopted by the corporation in this respect has made it many friends.

The inventory position of the corporation is vastly better than at the beginning of the year, as the result of heroic treatment. The new regime has written off its losses and all of them are behind it. It may be found when the inventories are completed that their market value is greater than the present book value, but if this is not the case, they will be written down to meet the market so that 1922 can be started with a clean slate.

Greater Volume for 1922

This policy of General Motors will permit it to turn out its products on the basis of present market costs for materials. It has made possible the sharp reduction in Cadillac prices and a further scaling down of the Buick sales prices. The corporation believes the prices of materials are as low as they will go for some time and that, as a consequence, no further price concessions are in prospect.

General Motors is determined, however, to sell its products at a price which will allow only a reasonable margin of profit. With this purpose in view it is constantly scanning its costs so that purchasers can be given the best values possible. This policy holds good in the export as well as the domestic field. There is no talk within the organization of a possible increase of prices in the coming year.

So far as production for 1922 is concerned, the corporation makes no predictions, but it can be stated that it expects to sell more cars than it did in 1921. It is believed that at present prices the Cadillac and Buick factories will be kept running at capacity. Chevrolet is expected to continue on the satisfactory basis which has prevailed for months, and the output of Oaklands has been increasing steadily of late. The past year has brought many minor improvements in the Chevrolet and Oakland.

Tentative schedules call for a considerably larger output than in 1921. They are based partly on the belief that domestic sales will be somewhat larger, and partly on the expectation, which amounts almost to a certainty, that the export business will be substantially increased.

Taking all factors into consideration, General Motors will start the year in a highly enviable position. Really remarkable progress has been made in 1921 in getting the big corporation back to normal and working on a cooperative basis which has strengthened each individual unit.

Used Car Problem Solution Hidden in Dealers' Replies

New York, Jan. 4—A wide diversity of opinion on the best means to solve the used car problem is shown in the large number of suggestions received from dealers by the National Automobile Chamber of Commerce in reply to the request for views on the subject in connection with the survey which is now being made. It is held to be significant that many dealers declare they are opposed to an increase in discounts, on the ground that they would be given away in trade. Many dealers endorse the slogan, "By Them Right." A further statement of the results of the survey will be made public as soon as an analysis of the suggestions received can be completed.

BIG YEAR FOR LOUISVILLE

Louisville, Dec. 31—A canvass of representative passenger car dealers in Louisville reveals the surprising fact that in 1921 many firms did a volume of business equal to that of 1920, which had been the banner year in the industry up to that time. Profits were not so great because of the reduced list price on all makes of cars, but the number of sales held up remarkably well for those dealers who kept "plugging." On one make the local sales of new passenger cars increased 45 per cent in 1921 over 1920.

SANFORD LIGHT MODEL

Syracuse, N. Y., Dec. 31—The Sanford Motor Truck Co. is bringing out a 1½-ton model equipped with electric starting and lighting, pneumatic cord tires, and capable of sustaining a speed of 25 m.p.h. This will supplement its line of trucks which are made in capacities of 2½, 3½ and 5-tons. The truck is designed by J. E. Gramlich, who recently joined the company, after having acted as chief engineer for the Watson Wagon Works for two years.

MUTUAL TRUCK PLANT SOLD

Sullivan, Ind., Dec. 30—The Mutual Truck Co. buildings have been sold to Sherman Osborne, of Bloomfield, for $9750. C. D. Hunt, receiver, conducted the sale. Osborne says that his plans are indefinite, but that he anticipates reorganization of the company and operation of the plant.

MILWAUKEE FALL SHOW DATE

Milwaukee, Wis., Jan. 2—The dates of Aug. 28 to Sept. 2 have been assigned to the Wisconsin State Fair of 1922, a feature of which is the fall automobile show, conducted under the auspices of the Milwaukee Automotive Dealers' Assn.

72 Signed-Up Exhibitors at Minneapolis Show, Feb. 6-11

Tractors and Power Farm Machinery Will Be Backed by Educational Program

MINNEAPOLIS, Jan. 3—Among those manufacturers who will exhibit at the Seventh Annual Tratcor and Power Farming Show at Minneapolis, Feb. 6-11, are the following:

Aro Mfg. Co., Minnapolis, Minn.
Advance Rumely Thresher Co., Laporte, Ind,
Avery Co., Peoria, Ill.
Aultman Taylor Machinery Co., Mansfield, O.
American Fruit Grower, Chicago, Ill.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Bassick Mfg, Co., Chicago, Ill.
Bates Machine & Tractor Co., Joliet, Ill.
C. L. Best Tractor Co., San Leandro, Calif.
Bryan Harvester Co., Peru, Ind.
J. I. Case Threshing Machine Co., Racine, Wis.
Chilton Co., Philadelphia, Pa.
Cleveland Tractor Co., Cleveland, O.
Clark-Turner Piston Co., Los Angeles, Calif.
Clarke Publishing Co., Madison, Wis.
Climax Engineering Co., Clinton, Ia.
Dakota Farmer, Aberdeen, S. D.
Eisemann Magneto Corp., Brooklyn, N.Y.
Fafnir Bearing Co., New Britain, Conn.
Fulton Co., Milwaukee, Wis.
Foote Bros. Gear & Machine Co., Chicago, Ill.
Farm Machinery-Farm Power, St. Louis, Mo.
Gray Tractor Co., Inc., Minneapolis, Minn.
Goodyear Tire & Rubber Co., Akron, O.
Gurney Ball Bearing Co., Jamestown, N. Y.
Hart-Parr Co., Charles City, Ia.
Huber Mfg. Co., Marion, O.
Heinze Electric Co., Lowell, Mass.
Holt Mfg. Co., Peoria, Ill.
Hyatt Roller Bearing Co., Chicago, Ill.
Ironsides Co., Columbus, O.
Imperial Belting Co., Chicago, Ill.
Indian Refining Co., New York, N. Y.
K.-W. Ignition Co., Cleveland.
LaCrosse Plow Co., LaCrosse, Wis.
Link-Belt Co., Chicago, Ill.
Midwest Engine Co., Indianapolis, Ind.
Michigan State Auto School, Detroit, Mich.
Midvale Steel & Ordnance Co., Philadelphia, Pa.
Manhattan Rubber Mfg. Co., Minneapolis, Minn.
Miller Traction Tread Co., 1201 Hartford Bldg., Chicago, Ill.
Monarch Tractor Co., Watertown, Wis.
Norma Company of America, Long Island City, N. Y.
New Departure Mfg. Co., Bristol, Conn.
National Carbon Co., Inc., Cleveland, O.
Oliver Chilled Plow Works, South Bend, Ind.
Port Huron Machinery Co., Port Huron, Mich.
Parrett Tractor Co., Chicago Heights, Ill.
Russell Grader Mfg. Co., Minneapolis, Minn.
Rowe Mfg. Co., Galesburg, Ill.
R. W. Co., Chicago, Ill.
Simms Magneto Co., East Orange, N. J.
SKF Industries, New York, N. Y.
Splitdorf Electrical Co., Newark, N. J.
Standard Oil Co., Minneapolis, Minn.
Standard Steel & Bearings, Inc., Philadelphia, Pa.
Stinson Tractor Co., Superior, Wis.
Stromberg Motor Devices Co., Chicago, Ill.
Sun Co., Philadelphia, Pa.

Timken Roller Bearing Co., Canton, O.
Twin City Co., Minneapolis, Minn.
United Mfg. & Distributing Co., Chicago, Ill.
United States Rubber Co., New York, N. Y.
Vortox Mfg. Co., Pomona, Calif.
Vacuum Oil Co., New York, N. Y.
Waukesha Motor Co., Waukesha, Wis.
Whitney Tractor Co., Cleveland, O.
Wagner Langemo Co., Minneapolis, Minn.
Whitehead & Kales Co., River Rouge, Mich.
W. S. Nott Co., Minneapolis, Minn.
Webb Publishing Co., St. Paul, Minn.
Wheeler-Schebler Carbureter Co., Indianapolis, Ind.

STANDARD PARTS PLANTS SALE

Cleveland, Jan. 3—Terms on which the Canton Forge plant, which is a subsidiary of the Standard Parts Co. of this city, were sold, became known when Federal Judge D. C. Westenhaver, Dec. 17, approved the private sale.

The purchasers of the Canton plant are Fred A. Poore and Phillip Poore, president and vice-president respectively of the P. & M. Co., of Chicago. The price was $293,500.

Judge Westenhaver has directed that the remaining unused machinery and fixtures in the American Ball Bearing plant, another subsidiary of Standard Parts, be sold at public auction.

In recent months the indebtedness of the Standard Parts Co. has been reduced to less than $3,000,000 from $10,000,000.

W. VA. DEALERS' CONVENTIONS

Elkins, W. Va., Jan. 3—At the second annual convention of the West Virginia Retail Automobile Dealers Assn. here Clarksburg was chosen as the next meeting place in October, 1922, and the following officers were elected: J. W. Reitz, Elkins, president; G. M. Ford, Wheeling, secretary-treasurer; J. W. Reitz; Wm. Michaels, Mannington; Dr. S. J. Keil, Bluefield; W. C. Helmick, Clarksburg; and J. H. Coleman, Wheeling, vice presidents; Bruce Perry, Huntington; M. E. Webb, Wheeling; C. A. Middleburg, Charleston; Dr. S. J. Keil, Bluefield; W. C. Helmick, Clarksburg and H. Marsh, Parkersburg, directors.

D. F. Drury, St. Louis, Mo., representative of the National Automobile Dealers Assl., spoke at the convention.

PHILADELPHIA THIEF RECORD

Philadelphia, Jan. 2—During 1921, 3261 motor cars, valued at $5,292,411, were stolen in this city, according to statistics of the police department.

The police have recovered in this period 2785 cars, with a total value of $4,806,181. More machines were stolen in the month of October than in any month during the year.

STICKERS SHOW TITLE

Wilmington, Del., Dec. 31—The state, through special officers appointed for the purpose, has begun the enforcement of a new law requiring a titling certificate for each car, showing a bill of sale. This evidence is carried on the car in the shape of a sticker.

1922 Finds Tire Companies Stronger Than a Year Ago

Increased Productions Are Expected to Start Early in the Year. Inventories Low

AKRON, O., Jan. 3—The tire companies here will start 1922 in a much stronger position than they were 12 months ago, and all of them are looking forward to increased productions early in the year. Inventories have been worked down and commitments still held by fabric and rubber producers have been adjusted on a satisfactory basis.

A year ago the Goodyear Tire & Rubber Co. was in the midst of financial difficulties which resulted in a reorganization, but it now has been brought to a strong financial position.

The Firestone Tire & Rubber Co. has taken all its losses, as shown by the last balance sheet, when assets were reduced from $107,000,000 to $75,000,000.

It is reported that the entire indebtedness of the Miller Rubber Co. has been wiped out, and the floating indebtedness of the General Rubber Co. has been liquidated.

Collins to Concentrate on Peerless Car for Present

Detroit, Jan. 3—R. H. Collins has postponed indefinitely, it is learned, the bringing out of the Collins automobile and will exhibit at the shows this year only the Peerless line with minor refinements and no change of price. After Collins left the General Motors organization he incorporated a company in Michigan to manufacture a high-grade car, and so far as can be learned he has not abandoned his plan of building one eventually.

IMPRISONMENT FOR SPEEDERS

Columbus, O., Jan. 3—An agitation has been started among the police and civil authorities of Columbus for changes in the ordinances which will provide for imprisonment of traffic offenders, especially speeders. Judge Ruth, in the municipal court, is backing the movement which has the support of the public generally.

GROOMS AS CAR PROSPECTS

Dallas, Tex., Dec. 31—Gus Diamond, Stephens dealer, has developed a new idea for selling automobiles. He watches the society page of the local papers and when he sees the announcement of an engagement of a wedding he gets right after the lucky man. Usually he sells him a car for the girl. Gus say it's a cinch to sell a bridegroom a car if he hasn't one.

DALLAS DEALERS SELL 35,000

Dallas, Tex., Dec. 31—Dallas automobile dealers have sold 35,000 cars this year, despite the fact that times have been called dull and money tight. Of that number some 30,000 were new cars valued at more than $30,000,000. Five thousand second-hand cars were sold at $2,500,000. This is the estimate made by a half dozen dealers as the year was closing, and some of the dealers said the sales might run a thousand cars more. Of the total number sold some 12,000 were sold by retailers in Dallas and the remainder sold by the wholesale houses here.

KENTUCKY WAGON PLANS

Louisville, Jan. 3—Stockholders of the Kentucky Wagon Mfg. Co., at their annual meeting Jan. 12, will be called upon to consider complete reorganization plans, contemplating either a merger with several other concerns manufacturing automobile parts or placing a mortgage for $750,000 on the plant and releasing it and its entire equipment to the Kentucky Mfg. Co., to be capitalized at $1,000,000.

The first plan suggests that a mortgage of $750,000 be placed on the plant, and the organization of a new company to be known as the Kentucky Mfg. Co., to which the plant of the Kentucky Wagon Mfg. Co. will be leased for from five to 10 years at $200,000 per year.

The second proposal is for a merger with other companies in a new organization for which the name Associated Motor Industries is suggested.

FORD INVADES GERMANY

Detroit, Dec. 31—A factory in Germany for the manufacture of automobiles for German, Russian and other eastern European fields is being planned by the Ford Motor Co. Charles E. Sorensen, a member of the Ford organization, left for Germany a fortnight ago. At present he is in London, following a visit to the Ford plant at Cork, Ireland. He will start for Germany within a few days, according to information here.

The present plan provides for the purchase of a large plant in Germany and conversion of it into a Ford factory. Announcement as to the size of the plant, the output and number of employes is withheld at this time.

THIEVES BOOST INSURANCE RATES

Charlotte, N. C., Dec. 31—Beginning with the first of the year the theft insurance rates on automobiles will be greatly raised in Charlotte and Mecklenburg county, the rates being placed on a parity with those prevailing in Chicago. The Ford is hit the hardest, the increase on this car being from $3.75 per $100 to $8.86 per $100. Other makes get a large increase but none so high as the Ford, which is ever attractive to the automobile thief. It is understood that rates for the entire state will also be increased, but none so high as the Charlotte rate.

Business Notes

Uradia Co., Houston, Tex., has filed suit against the Willis Storage Battery Co., its stockholders, and E. H. Golaz, chemist in charge of the food and drug bureau of the Texas State Board of Health, for $1,460,000 damages. The suit attacks a chemical analysis alleged to have been made by Golaz. For the Uradia Co. $1,350,000 damages are asked and for O. D. Thomas, head of the company, $110,000.

Western Gears & Parts Co., of Dallas, has added a new department—the spring department. It is something new in Dallas and the company reports a big business in the new repairing department. It caters to garages, fleet owners and service men, as well as individual owners.

Wichita Motors Co., manufacturers of the Wichita truck and the Price Campbell Cotton Picking Corp., have merged under the name of the Mechanico Agricultural Co., manufacturers of trucks and mechanical cotton pickers.

Superior Combustion Engine Corp., has been formed in Detroit to manufacture a two-cylinder two-cycle engine, which will burn either gasoline or kerosene, and designed for use in motor cars or boats. The feature of the engine is that the fuel, after carburetion, is automatically mixed or vaporized inside the cylinder. The officers of the company are Rufus A. Shorey, president; R. P. Grieve, vice president and engineer, and Arthur J. Crosbie, secretary and treasurer. The directors are Harry H. Wyatt, H. A. Consor, Walter Joy, F. D. Shoup, George H. Buck and C. G. Schoeffel.

Norman Piston Ring Corp., Peoria, Ill., has certified to an increase in the capital stock from $50,000 to $150,000, in order to provide funds for increasing the capacity of the plant.

Jury Mfg. Co., has been organized at Freeport, Ill., for the purpose of manufacturing and distributing what is known as the "High Ball Safety Signal," designed to be attached to motor vehicles for the purpose of preventing accidents and reducing congestion upon crowded thoroughfares.

W. H. Willennar, president of the Double Fabric Tire Co., Auburn, Ind., announces that the tire plant has been put on full time. The plant has been working two eight-hour shifts a day but is now working a 10-hour day shift and a 10-hour night shift.

Wetmore Mechanical Laboratory Co., Milwaukee, organized in 1915 by Charles P. Wetmore and P. B. Robers, is again actively engaged in engineering and manufacturing work. Charles P. Wetmore is president and P. B. Rogers secretary and treasurer.

HOLLISTER-WHITE INDICTMENT

Boston, Dec. 31—The Federal government sprung a surprise here when it took from the secret files and placed on the public files indictments against Hollister, White & Co., Inc., which includes among the companies that it reorganized the Hershel-Spillman Motor Co., North Tonawanda, N. Y., and the Hartford Automotive Parts Co., Hartford, Conn. The government alleges swindling running into millions. The indictments were returned following a long investigation.

Federal officers allege that Hollister, White & Co. reorganized several companies, some of which were Massachusetts corporations, and some of which were made so in the reorganization. It is alleged that the company floated issues of stock, common and preferred, and notes of the reorganized corporations, and in order to attract the investing public they issued alleged false financial statements about cash on hand, value of property, earning capacity and dividends.

BID FOR AMERICAN MOTORS

Plainfield, N. J., Dec. 30—Receivers of the American Motors Corp. have received from C. B. Penney, representing the "American Motors reorganization syndicate," a bid of $191,734, including a mortgage for $55,000, for all the assets of the corporation. The bid provides for an immediate payment of $100,000; a second payment of $25,000 on Jan. 15, $50,000 on Feb. 15, and $51,734 on March 15. Creditors of the corporation were directed by Federal Judge Lynch to show on Jan. 3 why an order should not be made authorizing the receivers to accept this bid and any other higher bid which may be made.

COLUMBIA MOTORS CONDITION

Detroit, Dec. 31—An encouraging picture of the condition of the Columbia Motors Co. is presented in a letter sent to the president of the Detroit Stock Exchange by A. P. O'Connor, secretary and treasurer of the Columbia company. He states that more than 350 cars were shipped in August and more than 300 in September. Thirty new dealer connections have been made in the past two months and trade on the Pacific coast has improved materially. Dealers in the southeast section have started ordering cars, stating that business is beginning to improve.

AJAX RUBBER CAPITAL INCREASE

New York, Dec. 31—Stockholders of the Ajax Rubber Co. will meet Jan. 11 to authorize the issuance of $3,000,000 first mortgage, 15-year, eight per cent bonds and to ratify an increase in capital from 400,000 shares of $50 par value to 500,000 shares of no par value. There are outstanding at present 200,000 shares of stock. An additional 200,000 shares will be offered to stockholders for subscription at $12.50 a share on the share for share basis.

WRIGHT BEARING RECEIVERSHIP

Philadelphia, Dec. 31—Assets of the Wright Roller Bearing Co., for which receivers have been appointed in United States court, are estimated at $884,000 and the liabilities at $529,000. W. B. Stratton of New York, one of the receivers, represents the interests of John N. Willys, who is the largest single stockholder. The receivers have been given instructions to continue operations, and it is expected the difficulties of the company will be straightened out.

BANK AND DEALER DEPARTMENT

Connersville, Ind., Dec. 31—A new subsidiary to be known as the bank relations department has been organized by the United States Automotive Corp., one of the units of which is the Lexington Motor Co. It has been established to make a study of improving relations between bankers and motor car dealers. Frank B. Ansted, president of the United States Automotive Corp., is a banker, and several directors of the new company also are bank directors.

Strasbourg Gets Grand Prix Races—Dates July 15-16

Many Entries Listed—German Cars Will Compete at Milan in September

PARIS, Dec. 23 (By Mail)—Strasbourg has been selected as the scene of the French Grand Prix races on July 15 and 16. There will be two distinct events, the first one being for racing cars of not more than 122 cu. in. piston displacement, with a minimum weight of 1,433 lbs., and the second one for fast touring cars with a minimum weight of 3,086 lbs., which will be given a supply of gasoline and oil equivalent to 13.7 miles per gallon. The Strasbourg course, being only 8.3 miles round, is the shortest ever used for an automobile race in Europe. The roads form a triangle, are practically dead level, do not pass through any village, and are of macadam made with hard granite which will stand up under racing stresses. Two of the legs are just over three miles each in length and dead straight, with a width of 40 ft. in most places; the width of the third leg, which is slightly less than two miles in length, will be 25 ft. Grandstands will be erected on a very slight down grade. near the end of the fastest stretch; from this point there will be a bird's eye view over the whole course.

Twenty cars are expected to start in the 122 cu. in. race. Those at present officially entered are Rolland-Pilain, with three eight-in-line engines, Sunbeam with a team of three, and Delage with one car. Bugatti is expected to put in four machines; Mathis is counted on to supply three; Ballot doubtless will enter a team, and Peugeot from France and Fiat from Italy are being counted among the starters. The club has fixed a minimum of 30, but it is known that the race will be held even if only half this number is attained. The only entries received up to the present for the touring car fuel consumption Grand Prix are three Voisin and two Delage cars.

German cars will be seen for the first time in a big European road race next September, when the European 183 cu. in. Grand Prix will be run over a short course near Milan, Italy. The promise has been received of a team of Benz and a team of Mercedes 183 cu. in. cars. The Mercedes company has its racing cars ready for the road, and would have sent them to America had they been admitted in the Indianapolis 500-mile race. The European Grand Prix will have cash prizes totaling 500,000 liras.

KROYER MOTORS CO. MOVES

Los Angeles, Dec. 30—Reports that the Kroyer Motors Co., a $5,000,000 company engaged in the manufacture of tractors at Stockton, has removed its plant to Los Angeles, is confirmed by J. M. Kroyer, president of the company. The present factory at Stockton covers 30 acres and is devoted entirely to the manufacture of tractors and tractor parts.

Code of Ethics to Govern Indiana Trade Association

Golden Rule Plus "Quality Not Quantity" Motto to Direct Hoosier Business

INDIANAPOLIS, Dec. 30—Effective Jan. 1, the Indiana Automotive Trade Assn. will be governed in its dealings with the public and in its association of its members by a code of ethics that has for its motto "Quality Not Quantity."

The new membership policy embraces a code of ethics with many new points and a complete set of rules. Any business that does not measure up to these requirements will not be accepted into membership. Before acceptance, the proposed new member must be vouched for either by his local association or by a district director of the state association.

A publicity campaign that will popularize the emblem and the membership requirements will be opened in every community where 10 or more I. A. T. A. memberships exist. The state association will make this a cooperative campaign bearing part of the cost. It is the intention to make this new policy dovetail into the new policy announced by the N. A. D. A., although the Indiana step was taken without knowledge of the N. A. D. A. plans.

The detailed requirements of the I. A. T. A. are as follows:

An established place of business is required of all members or applicants.

Distributors shall not recognize or encourage curbstone dealers or agents; shall use every means to encourage dealers to conform to I. A. T. A. ethics and policies; shall cooperate with dealers and associations in efforts to eliminate unprofitable practices in handling of used cars and other phases of the business; shall not permit traveling salesmen or representatives to quote used car allowances in excess of or in violation of policies enforced by any local dealer organization. (Same general requirements for jobbers.)

Dealers must maintain an established place of business; shall keep place of business clean and inviting; shall maintain cooperation with co-dealers on policies designed to eliminate unfair practices in handling of used cars and other elements of the business.

Accessory Dealers shall sell equipment and supplies of recognized merit at fair prices, in keeping with conduct of a merchandising institution on a profitable basis.

General Requirements Covering All Businesses—Members shall use honest materials and parts; shall be willing to undergo special inspection to determine efficiency of methods and equipment; shall have place of business which conforms to the requirements of the state fire marshal; shall use every precaution to protect customers' cars and property against loss and damage; shall have an adequate system of recording and checking in and checking out of cars stored, together with scale of prices prominently displayed or made known to customer; shall not discriminate in rates and prices charged, between local customers and tourists; shall keep place of business as clean as possible; shall have adequate and efficient time keeping and accounting systems, sufficient to assure customers of fair and reasonable charge and prevent misunderstandings; shall cooperate with trade organizations in local community for improvement of methods and service and elimination of waste and inefficient practices in business.

Case Has Two New Models, X and W, for 1922 Season

Racine, Wis., Dec. 31—Two new Case models are to make their appearance for the 1922 season, these being models X and W. Model X will be priced at $1890 for the touring car and $2790 for the sedan. It has a wheelbase of 122 in., Continental 7-R engine, bore 3¼ in. and stroke 4½ in. A Rayfield thermostat controls the cooling water, and the starting and lighting system is Bijur.

The other model, W, is to sell at $2380 for the touring car and $3375 for the sedan. Details on this latter model are not yet available.

COLUMBUS DEALERS OPTIMISTIC

Columbus, O., Jan. 3—The year 1921 was not a good one in the automobile business in Columbus and central Ohio. On the other hand, it was not as bad as had been expected, and when the records are cast up dealers generally will have found that their profits, while cut to a lower point than in former years, will be considerable. Of course, there are many instances where real losses have been experienced, many of these being followed by receiverships and sheriffs' sales. But, on the whole, the substantial dealer who was well fortified with credit has come out of the year in fairly good shape.

A large majority of the dealers believe 1922 will be better than 1921.

BUS DEPOT IN PORTLAND

Portland, Ore., Jan. 3—Portland's new bus depot, a new $15,000 structure in the heart of the city, was opened for use last week, and now is running full swing. The depot is owned by a corporation formed by the bus line owners, and represents the fruits of a cooperative movement on the part of the bus operators. More than 100 buses leave the station daily, some of them bound for points 100 miles distant.

PURDUE TRACTOR COURSES

Lafayette, Ind., Dec. 31—Starting Jan. 23, Feb. 6 and Feb. 20, three courses in the use of tractors, etc., will be given by Purdue University for the benefit of Indiana farmers or tractor men who are interested in the more efficient operation of gasoline tractors and engines.

Forbes Succeeds Mixter as Head of Pierce-Arrow Co.

Appointment Thought to Herald Return of Other Old Officials to Organization

BUFFALO, Jan. 4—George W. Mixter, who became president of the Pierce-Arrow Motor Car Co. last May, when G. W. Goethals & Co. retired from the management, has resigned. He will be succeeded as president by M. E. Forbes, who has been vice-president and treasurer of the company for some time.

Mixter took active charge of the Pierce-Arrow plant when Goethals & Co. were employed to assist in bringing the factory to a peace-time basis and also to aid in revising its line of cars and trucks.

Colonel Charles Clifton, chairman of the board, in announcing the resignation of Mixter, said he consented last May to remain as president "until certain special work he had inaugurated was completed." This work has not been finished, but the president asked to be relieved. It would not be surprising if the retirement of Mixter might result in a return of some of the former executives of the Pierce-Arrow company. It has been persistently reported for several months that Henry May, who formerly was vice-president in charge of manufacturing, would return. Forbes is one of the old guard in the organization.

Colonel Clifton said the plant now is employing about 3200 men, as compared with 1800 when the low point of production was reached several months ago. He added that operations in the last few months indicate that the company "has a product which can be manufactured with satisfactory results both to the public and to stockholders."

COUNTY DEALERS ORGANIZE

Sullivan, Ind., Dec. 31—Harry Dilley, operator of a battery and ignition station, was elected president of the recently organized Sullivan County Automotive Assn., which starts with 29 members. In fixing the yearly dues, they were made to provide for complete affiliation with the Indiana Automotive Trade Assn. and the National Automobile Dealers' Assn., payable annually in advance, and all members or businesses intending to take part in the organization work were required to pay in the first year before taking part in the organization meeting.

ENTERTAINS DEALERS

Memphis, Tenn., Dec. 30—The Osburn-Abston Co., Memphis, entertained a hundred or more men connected with the automotive and accessory trade in Memphis at a luncheon in December, at which ways and means for increasing the sale of automotive equipment in the city was discussed. A photoplay showing the contrast between a wideawake and a slow accessory dealer, was shown.

In the Retail Field

Portland Motor Car Co., Portland, Ore., has secured the wholesale franchise for the Nash for the entire state of Oregon, separating directly under the factory. The company also handles the Packard and Nash lines in Multnomah and Washington counties.

Oregon agency appointments include the following: E. A. Dunham of Klamath Falls, Chalmers, Franklin and Studebaker; J. R. Caseburg, Waco, Ore., Hudson and Essex; H. S. Royce of Bend, Ore., Velie, Hudson and Essex; Stoney Wells of Marshfield Auto Co., Marshfield, Ore., Hudson and Essex.

P. H. Buchholz, Portland, Ore., state distributor for Winther trucks, has opened permanent headquarters at 527 Washington Street.

O'Brien Brothers, Chicago distributors of the Stanley Steam Car, have moved their sales headquarters from Indiana and 21st streets to 2619 South Michigan avenue.

W. E. Frankenfeld, Springfield, Ill., has purchased the Centennial garage at 224-226 West Edwards street, and J. W. McCain, who retires, plans to go to Georgia.

Farm Power Co. has been organized at Springfield, Ill. The company will specialize in tractors and other power farming machinery. Officers have been chosen, as follows: president, J. H. Colean, Pawnee; vice president, H. C. Carvey, Buffalo; secretary, B. R. Butts, Springfield; treasurer and general manager, C. E. Carpenter, Springfield. The company has been made Goodyear service sepresentatives for the Sangamon county territory.

McCreary Tire Sales Co., Peoria, Ill., and the Independent Motor Supply Co., Ottawa, Ill., have been consolidated under the latter name, but with headquarters in Peoria. It is proposed to handle both a wholesale and retail accessory business, specializing in tires.

Mooseheart Keller Automobile Co.'s plant was burned this week. A number of automobiles were destroyed. The loss was about $75,000 which was fully covered by insurance. The business will be reopened immediately, it was said.

Auburn Automobile Co., of Auburn, Ind., gave a bonus to all its employees who have been on its payroll since the first of June.

Dillon Service Co., Dillon, S. C., an automobile supply firm, has been chartered with a capital stock of $20,000. J. R. Regan is president and W. Floyd secretary and treasurer.

Merrick Motor Co., Wilmington, Del., distributor for the Marmon car, last Thursday evening gave a dinner to the employes, at which the officers were present and joined in the fun.

C. J. Kelly, automobile dealer of Sanford, N. C., was sentenced to five years in the Atlanta penitentiary and fined $5,000 in Federal Court on the charge of interstate traffic in stolen automobiles.

William Juneau, veteran Seattle automobile man, has discontinued the automobile school which he has maintained for the last seven years, and has leased the Colonial Garage and will operate a storage and service garage.

Goodyear dealers, Seattle, have perfected an organization with Jack Case, Case Tire Co., as president. Earl McKale, McKale Brothers, is vice president, and C. J. Ernst, Miller-Lowe Tire Co., as secretary. Charter members include, besides the officers, Triangle Tire Co., Metropolitan Garage, M. P. Claussen, Ben Kline, Western Tire Shop, New University Garage, Stanley Nelson, Capital Garage, O. T. Clark Company, Universal Repair Shop. Later the new association will elect a delegate to represent Goodyear dealers in the Seattle Automotive Trades Association.

Eldridge Buick Sales Co., Seattle, put on a Closed Car Week show, with the entire sales force concentrating on moving enclosed cars.

National Automotive Co., Indianapolis, Indiana distributor of the National, has recently added the Moon for state distribution according to the announcement of George Crane, president and general manager.

Dechert & Walker, Springfield, Mass., has discontinued the sale of the Lexington car, and for the present will deal only in used cars. The firm has moved into larger quarters.

Durant Motors, Inc., has completed a thorough survey of the Western New England field, preliminary to perfecting its sales organization here. It is stated that the name of its Springfield representative, with plans to further the distribution of its cars, will be announced shortly.

John G. Wollaeger Co., Milwaukee, distributor of the Studebaker, has increased its capital stock from $50,000 to $150,000. It is erecting a new four-story sales and service building to cost about $120,000.

C. V. Rainey Auto Co., Jasper, Ala., has moved into new salesrooms.

Downer Garage & Sales Co., Milwaukee, has been appointed distributer of the new Ruggles truck in Wisconsin.

Redner Automobile Co., Neenah, Wis., which recently was appointed Wisconsin distributor of the Peerless and opened temporary headquarters, has moved into its permanent home at 521-525 Jefferson Street, Milwaukee.

W. E. Propst has been appointed Milwaukee manager of the Milwaukee branch of the Miller Rubber Co.

E. R. Parker Motor Co., Birmingham, Ala., will close out their agency for the Chandler car, which agency will be taken over by Burns Brothers, who formerly were the Birmingham Chandler agents. The Parker Motor Co., which also has salesrooms on West Peach Tree Street in Atlanta, are agents for the Cleveland and Marmon in addition to the Chandler, and will retain the agency for these cars.

J. George Pelton, head of the Franklin Motor Co., Minneapolis, has taken over the staff of mechanics at the Winton branch, now closed. At a cost of $8000 he has acquired the service department and parts. The company will sell its remaining Franklin cars and will be able to handle Franklin service as well as the Winton service.

Lawrence Ramsey has opened a general garage at Shelby, N. C.

Graham Dellinger has sold his agency interest in the Studebaker agency, Shelby, N. C., to Lawrence Lackey, who now becomes a partner with Frank E. Hoey, the firm name becoming Hoey & Lackey.

Edward Mueller, late of western Illinois, and for several years manager of the Cadillac Co., Quincy, Ill., has been appointed Cadillac distributor at Springfield, Ill., and has opened a sales agency.

Loef & Timm, Manitowoc, Wis., have taken over the local Kissel franchise.

Rennick Motor Co., Wilmington, Del., has taken the agency for this territory of the Maxwell and Chalmers lines.

Wisconsin Rubber & Tire Co., Milwaukee, has changed its corporate title to Simmons Tire Corp.

Apperson Motors of the Northwest, Inc., Minneapolis, with G. W. Gilson as manager, has bought property for sales, service and storage. The territory is Minnesota, the Dakotas, Montana and Wisconsin.

Minnesota Batometer Co., Minneapolis, has been formed to distribute the batometer, a device to show battery condition.

Jewell-Bassett-Jewell Co., Columbus, O., has been incorporated with a capital of $100,000 to buy and sell automobiles, especially used cars, to recondition them and to operate a general automobile business.

Bull Co., Columbus, O., chartered with a capital of $15,000 to manufacture spark plugs for automobiles, will soon open an assembling shop there.

Curtis Mfg. Co., Minneapolis, has been organized to make automobile parts and accessories, with authorized capital of $50,000. Emmett Curtis is president, Roy Mills vice-president, and Henry F. Hacker secretary-treasurer.

Bennett-Wilcox Carbureter Co., Minneapolis, has incorporated at $100,000.

Masters Motor Co., Minneapolis, $50,000 capital. F. C. Dressel is president, E. Hool is vice-president, and C. M. Johnson is secretary.

The Flint Motor Co., agent for the Velie in Birmingham, Ala., is quitting the automotive field, the location having been leased by the Edwards-Hanna Motor Co. The Edwards-Hanna Co., agent for the Ford, will occupy the property shortly after the first of the year.

Irwin Lewis, Waupaca, Wis., has started construction work on a new garage and service building, 30 by 120, to be ready about March 1. It will cost $12,000 complete.

George W. Field, Monroe, Wis., has acquired the one-fourth interest of J. J. Tschudy in the Monroe Sales Co., recently appointed Ford dealer, also handling the Western farm lighting system and a line of farm specialties. The other partners are Roy Jaberg, Dr. W. G. Bear and Fred Faeser.

E. J. Q. Car Co., Eau Claire, Wis., has been incorporated with a capital stock of $10,000 by Charles E. Jordan, B. E. Erickson and David Quinn, all of Eau Claire, to engage in the general automotive business.

Squires & Wheeler, Janesville, Wis., have taken possession of the new garage, salesroom and repairshop and will also continue to occupy the present garage adjoining.

Dodge Bros. Agency, Fond du Lac, Wis., has moved into new and larger quarters.

Butler Garage, Milwaukee, a service and repair station, has been dissolved. Jack A. Butler retires and the business will be continued by Edward A. Brunk, who assumes all assets and liabilities.

Protecto Tire Co., Wittenberg, Wis., a new $5000 corporation organized by W. D. Haseltine, J. Lurasek and Oliver A. Olsen, to manufacture and deal in tires, specialties, supplies, etc.

Lijeski Garage, Amherst Junction, Wis., owned and operated by Anton Lijeski, was burned Dec. 24, causing a loss of $15,000. It will be rebuilt early in the spring.

Sladky & Schroeder Co., Manitowoc, Wis., has been appointed Reo dealer in Manitowoc county.

Hackney & Son, automobile dealers, Wilsion, N. C., was visited by foes recently. The building and 100 cars and trucks were destroyed with a loss of $500,000, with $360,000 insurance. Plans are already under way for a new building.

Oakland garage, Hornell, N. Y., owned by Perry Freelove, was burned recently with loss of $45,000. Fourteen automobiles were included in the loss.

J. J. Hunt has been appointed distributor in the New York Metropolitan district for the new Rickenbacker car.

Federal Corp. assets, formerly engaged in making spark plugs in Westfield, Mass., has been sold to Richard J. Burton of Brookline, Mass. It is reported a new concern will be formed to continue making the spark plugs, with a factory near Boston.

Diatto car will soon be offered in Springfield, Mass. A number of touring and town cars have been shipped from Genoa to the R. & V. Motor Sales Co., and will be shown in Forest Park Garage.

Nash Motors Co., four-cylinder car division, Milwaukee, has presented the College of Engineering of Marquette University of Milwaukee with a Nash four-cylinder engine and transmission for installation in its laboratory of mechanical devices for practical use and study.

Luther Grinder Mfg. Co., Milwaukee, manufacturer of tool grinders and similar mechanical specialties, has enlarged its line of products and is now making on a commercial scale a new hot water heating system for motor cars. It will be marketed as the Diamond heater in a variety of sizes. The radiator is connected with the circulating water system with a control valve placed as the owner desires it.

Sundby Battery Co., Milwaukee, has been incorporated with an authorized capital stock of $500,000 to manufacture storage batteries and similar automotive specialties.

Chidester-Frint, Inc., Milwaukee, a new $100,000 corporation organized to serve as distributer of the new Durant in Wisconsin and Upper Michigan, has established sales and service headquarters at the former home of the Milwaukee branch of the Mitchell. The general management is in charge of Ray C. Chidester, who resigned as manager of the Milwaukee branch of the Packard.

Jack Evans Auto Sales Co., Racine, Wis., has been forced into involuntary bankruptcy by creditors, who claim that assets of the company will approximate $80,000 with liabilities of $85,000.

Rolls-Royce plant at Springfield, Mass., is making preparations for increased production. The definite schedule for 1922 has been worked out and will be started Jan. 1.

Z Garage Co., Spokane, through its president, M. D. East, has announced that it will build a new garage to cost $250,000. The company has $1,000,000 capital.

Auto Specialties Mfg. Co., St. Joseph, Mich., is working day and night shifts to meet demands for its Dreadnaught shock absorbers and Dreadnaught screw jacks, the later being standard equipment on Studebaker, Dodge and Grant cars.

STATE CONTROLS BUSES

Portland, Ore., Jan. 1—Operation of motor buses and trucks engaged as common carriers in Oregon is placed under the strict direction of the Oregon public service commission, according to a law passed at a special session of the legislature this week. While the law is aimed to protect the public roads and to guard the welfare of the traveling public, it has the support of the legitimate bus lines.

Concerning Men You Know

George W. Cushing, advertising manager of the Hudson Motor Car Co. and Essex Motors, has resigned to become associated with the advertising agency of Barton, Durstine & Osborne, Inc., New York City. Cushing will work in the Buffalo office of the company. Before joining Hudson he was advertising director of Federal Motor Truck Co.

E. Luman Mills has been appointed sales representative of the Klaxon Co., Newark, N. J., in the eastern territory including the states of New York, New Jersey, Pennsylvania, Maryland, Delaware and the District of Columbia.

F. D. Murray, manager of the Houston branch of the Hassler-Texas Co., distributor of the Hassler shock absorber, has returned from the Hassler factory at Indianapolis, where he attended a successful dealers' convention.

Col. B. R. Webb, Buick executive in south Texas, after two weeks in the north visiting the Buick factory, has been spending a few days in Houston before returning to San Antonio. He says that business is improving, especially in the industrial sections.

Wm. A. Ryan, manager of sales for the entire Ford Motor Co. organization, is now on a tour of the southern branches of the Ford company and spent a day at Houston in attendance at the annual convention and get-together meeting of the Ford dealers in the territory served by the Houston branch of the Ford Motor Co.

F. J. Leyerle has been appointed service manager of the Franklin Automobile Co., succeeding Paul Williams. The appointment was effective Dec. 12. Leyerle has been acting as assistant to President H. H. Franklin Since April 1.

Frank M. Germane, for many years associated with the Standard Roller Bearing Co., of Philadelphia, and its later evolution into a subsidiary of the Marlin-Rockwell Corp., has taken up his newer activities with the Gilliam Mfg. Co., Canton, O., as vice president.

J. J. Cole, president of the Cole Motor Car Co., and his family have reached France after leaving Indianapolis about 10 days ago. Cole plans to make an extended visit of France, Europe and Egypt before he returns. While the trip is mainly for recreation and rest, Cole will make a study of European motor car conditions and development. He will not return until April.

O. H. McCornack has been elected vice president of the Hudson Motor Car Co. Mr. McCornack, who has been general sales manager of the Hudson Motor Co. for the past five years, will continue in charge of sales, advertising and service activities in connection with both Hudson and Essex cars.

Peter S. Steenstrup, vice-president and general manager of the General Motors Export Co., has been transferred to the General Motors Corp., as an assistant to Alfred P. Sloan, Jr., to undertake special duty.

Charles H. Domville, who several months ago joined the Commonwealth Motors Co. in the capacity of district sales manager, has just been appointed assistant sales manager.

R. H. Burke, Seattle, has resigned as advertising manager for the Eldridge Buick Sales Co., in order to join the active sales force. He will make the change Jan. 1. He was formerly with the advertising department of the Seattle Times.

Leon S. Wescoat has been appointed treasurer of Earl Motors Inc., with headquarters at Jackson. Wescoat was formerly treasurer of the Fisher Body Co., Detroit, and is well and favorably known to the trade. John Fletcher, vice president of the Fort Dearborn National Bank, Chicago, and former treasurer of Earl Motors Inc., resigned as treasurer of Earl Motors Inc., effective Dec. 31, as a result of his many banking obligations.

Orville E. Truesdell and Ollie V. Garrison have joined the Bimel Spoke & Auto Wheel Co., as secretary-sales manager and assistant to the president, respectively.

Harry W. Skinner, president of the H. W. Skinner Motor Corp., Inc., has been elected president of the Utica Automobile Dealers Assn. He has previously served the organization as vice president and secretary and since its organization has been a member of its board of directors. Other officers elected were: vice president, Glenn Hughes; secretary, E. P. Robinson; treasurer, W. W. Garabrant.

H. E. Keller has been appointed director of sales of the Diamond Rubber Co.

M. A. Pollock has been made assistant sales and advertising manager of the Rolls-Royce company. P. D. LeVenees has been made works sales representative and C. A. Warren has been added to the New York City sales force.

S. F. BOWSER RETIRES

Fort Wayne, Ind., Dec. 30—S. F. Bowser, founder and president of S. F. Bowser & Co., Inc., of this city, manufacturers of gasoline pumps and tanks, has retired from the presidency to become chairman of the board of directors, and S. B. Bechtel, vice-president and general manager, has been named as president. In addition to this, a number of other changes in the company's personnel have been made. H. J. Grosvenor, secretary of the company, has been elected secretary and treasurer. D. G. Milligan, former treasurer, has been put in charge of foreign sales. W. A. Bersch, for the last year comptroller, has been elected a director of the company and also retains his position as comptroller.

STONE IS PROMOTED

Cleveland, Jan. 3—Earl B. Stone, who for two and one-half years has been connected with the Cleveland Tractor Co. as sales representative, district sales manager and assistant advertising manager, has succeeded George B. Sharpe as advertising manager. Sharpe, who has been with the Cleveland company for several years, resigned to go with the Burroughs Adding Machine Co. Stone has had advertising experience for many years with the General Fireproofing Co. and the National Acme Co. Sharpe began his association in the advertising field with the Studebaker company many years ago and has been one of the aggressive men in the tractor advertising field for several years.

OFFER FOR ALLEN PLANT

Columbus, O., Jan. 3—The future of the Allen Motor Co. of Columbus, now in the hands of George A. Archer and William C. Willard as receivers, will be determined at a meeting of creditors to be held in the near future. The receivers have received an offer of $570,000 for all of the assets of the company, not including cash, accounts receivable and notes receivable. This is the best offer so far received, and it is probable that the court will be asked to accept it. If this is not accepted, the property will be advertised and sold under a judicial order.

November Accessory Sales Close to Monthly Average

Small Decrease Over October Keeps Volume Higher Than Expected by Manufacturers

NEW YORK, Dec. 31—Sales by members of the Motor and Accessory Manufacturers' Assn. for November were only approximately $3,000,000 less than for October and about $4,150,000 less than for September. This volume of business was considerably larger than was expected at the beginning of the month. Present indications are that sales for December will equal those for November and may exceed them. November marked the ninth consecutive month with comparatively little variation in the volume of sales.

November brought a small decrease in the total of past due accounts, but a small increase in the total of notes outstanding. It was the first month since August to show a decrease in the total of past due accounts. The total of notes outstanding at the end of November was virtually the same as at the end of September. The figures for each month year will be found in the table below.

OFFER $400,000 FOR BETHLEHEM

Allentown, Pa., Dec. 30—Local creditors of the Bethlehem Motors Corp. have been informed by Clinton E. Woods, the receiver, that an offer of $400,000 has been made for the plant, but that creditors' committees had decided not to sell for less than $750,000, although the plant has deteriorated rapidly since operations were discontinued. Claims against the company aggregate more than $3,000,000 and creditors will not realize more than 20 cents on the dollar.

TO PUBLISH LENS TEST

Wilmington, Del., Dec. 31—Following a motor lens test, held here a few nights ago under the direction of state officials, announcement was made by L. C. Josting, of the secretary of state's office, that an official list of lenses, permissible in this state, will be published about Feb. 1. He also said that rigid enforcement of the law in the matter will be started at that time. The law was enacted three years ago, but has not been rigidly enforced.

Accessory Market by Month for 1921

Month	Total Purchases	Per Cent Change	Total Past Due	Per Cent Change	Total Notes Outstanding	Per Cent Change
January	$6,264,587	.....	$8,099,727	.....	$4,359,871	.....
February	10,408,962	66.15*	6,717,165	17.07†	6,063,118	39.08*
March	20,120,386	93.30*	5,603,992	16.57†	5,069,877	16.38†
April	26,746,580	32.93*	5,352,271	4.49†	5,371,086	5.94*
May	26,781,350	.13*	4,505,176	15.64†	4,460,355	16.77†
June	22,703,414	15.19†	4,720,973	4.79*	4,012,670	10.37†
July	23,096,214	1.68*	5,242,046	10.79*	3,690,154	7.90†
August	23,397,640	1.31*	4,348,790	17.06†	3,494,510	5.30†
September	23,141,891	1.09*	4,358,545	.22*	3,677,500	5.24*
October	22,053,327	4.70†	4,512,680	3.54*	3,463,500	5.82†
November	18,998,490	13.85†	4,352,000	3.56†	3,661,900	5.73*

The Readers' Clearing House
Questions & Answers on Dealers' Problems

Transposing Timing in Degrees to Inches of Piston Travel

Q—Give the distance piston travels up the intake stroke before the camshaft starts to open the intake valve on No. 1 cylinder, so that I could measure the distance in inches on the cylinder wall.—Mike Doros, Saskatoon, Sask., Can.

To reduce degrees of crankshaft rotation to inches of piston travel requires that two factors be known: the stroke in inches and the length of the connecting rod. The length of the connecting rod is measured from center to center. First procure a compass, a pair of dividers and a protracter. A sheet of paper approximately two feet long by one foot wide, should be used for laying out the diagram. Now let us suppose that the stroke is five inches, and the length of the connecting rod eight inches. Draw the line AB lengthwise of the paper, then draw the circle with the radius of five inches, or set the compass to 2½ in., using AB as a center. This will represent the crankpin travel.

Now lay off the valve timing; for example, the exhaust valve should open 10 degrees after upper dead center; let D represent this point. Using the line AB as a base, with the protractor lay off 10 degrees to the right of the upper dead center line X, as shown in the illustration Fig. —. Proceed in the same manner on the intake opening, which should occur at a point 15 deg. past upper dead center, which is shown at E on the illustration. The intake on this particular engine closes 40 degrees past lower dead center. This point is located by the protractor, using the line AB as a base. Of course this point is laid off to the left of the case line AB, the point Y representing the lower dead center. The exhaust opening is located in the same manner. After all the valve opening and closing points have been located on the circle, they should be projected. This is done by setting the compass or dividers to the exact connecting rod length, which in this case is known to be eight inches. With the point Y as a center lay off the arc along the line AB which will give Y, which is the piston lower dead center. Then with the point X as a center, lay off the arc X which is the piston upper dead center or the top of the piston travel.

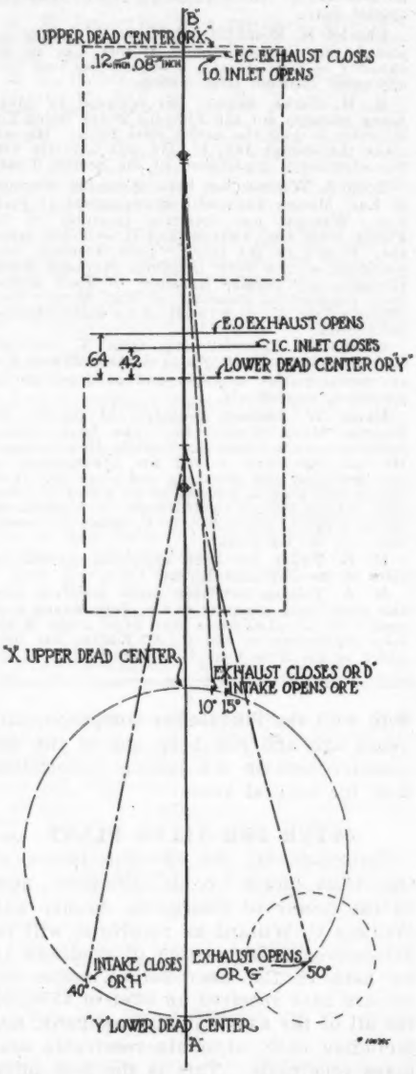


Fig. 1—Timing of engine shown graphically. The circle represents the path of travel of the crankpin

With the point D as a center, lay off the arc along the base line AB, using the same compass setting. The arc so made will represent the actual distance from the upper dead center point of the piston to the point where the exhaust valve closes. This is shown by measuring the distance on the paper between the upper dead center mark X, and the point where the arc bisects the base line AB. This by actual measurement is found to be .12 inch. The same procedure is followed on all the points E. G and H. The lines along the base line AB with the distances marked are the arcs referred to, but here are shown as straight lines. With the aid of the ruler the distance of these arcs from the two projected dead center lines is measured and the measurements thus secured are the fractions of an inch of the piston travel where the valves either close or open.

In the illustration the distances are laid out in decimals of an inch. The dotted small circle represents an end view of the crankpin. The dotted vertical lines are the theoretical angles of the connecting rod at different valve opening and closing positions.

EFFECT OF AIR DENSITY ON ENGINE PERFORMANCE

Q—The writer has recently driven two Ford cars from this place to lower altitudes, once to California and once to Phoenix, Ariz. In each case, when we reached an altitude of 3500 ft. or lower, a noise appeared in the engine which was not exactly a knock but sounded more like a noise produced by dry pistons. This noise was present as long as we remained at the low altitudes, especially when the engine was a little warm, but it absolutely disappeared when we got above 3500 ft. altitude on the return trip. We do not think that it was carbon, as one of the engines was overhauled just before leaving. Neither could it have been loose bearings or piston slap, as the engines are both in first-class condition. Was it a fuel knock, or was it something else?

2—Explain the fuel knock theory.—Jennings Auto Co., Holbrook, Ariz.

1—Yes.

2—The phenomenon known as fuel knock, detonation, and pinking is not fully understood. The term detonation implies that something occurs in the cylinder which corresponds with the detonation of a high explosion. Fuel knock, as ordinarily understood, is characterized by the following: a very sharp metallic noise; bright yellow flame within the cylinder; decrease in power; increase in heat rejected to the water

The Readers' Clearing House

THIS department is conducted to assist dealers and service station executives in the solution of their problems.

In addressing this department, readers are requested to give the firm name and address. Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been made and these are answered by reference to previous issues.

Inquiries not of general interest will be answered by personal letter only. Emergency questions will be replied to by letter or telegram.

Addresses of business firms will not be published in this department but will be supplied by letter.

Technical questions answered by B. M. Ikert and P. L. Dumas; Legal, by Wellington Gustin; Paint, by G. King Franklin; Architectural, by Tom Wilder; General Business questions by MOTOR AGE organization in conference.

jacket; destructive mechanical effects; occurrence of smoke in the exhaust, and preignition in most cases. Observations show that the occurrence of the knock is intimately related to certain factors such as chemical composition of the fuel, compression pressure, position and number of spark plugs, shape of piston head and combustion chamber, and the mixture ratio and temperature. It is known that this knock is accompanied by sudden rises in the cylinder pressures at the time of ignition. One theory is that this rise in pressure distorts the cylinder walls, causing the metallic knocks. Considerable research is being conducted at the present time along these lines, but no satisfactory explanation has as yet been formulated.

LEGAL ADVICE

LICENSE FOR MECHANICS AND GARAGE LIEN LAW

Q—Please let me know the following:

1—Does a person working in a garage as a mechanic have to have a chauffeur's license, that is, a proprietor's helper?

2—Does the employer have to have one for working on cars and testing on the road according to law?

3—What about the Garage Lien Law that we are supposed to have for the protection of garages in this state for work done on cars and parts sold for cars? Do you know of anyone who has tried this out and made it hold strictly to the law? Where can I get a copy of this law quickly if I want it?

4—What about the new law that we are supposed to have that compells us to have a license and give bonds to store cars in a garage? Does this have reference to a garage such as we run here in a small place, storing, say, probably ten or a dozen cars during a year over night for salesmen that happen to stop? Can a garagekeeper be exempt from this license by not storing cars at all—that is, any transit trade or otherwise, only the cars that he happens to have on hand that he is repairing and does not get finished and has to keep them over night or possibly longer? I have seen the notice of this law and I have also noticed the contradiction of this same law, and for this reason I am writing you for the information. If we are supposed to be in line for this law, when does it take effect?

5—In regard to the Garage Lien Law, we will say that we would like to hear from you by return mail, because we believe the law gives us ninety days to adjust our claims, otherwise they are no good, as far as the car is concerned. My time is limited to get my claim, if the law can be forced. We are regular readers of your magazine and also Motor World, and will say that we receive lots of business hints and helps from them.—D. E. Crum, Cropsey, Ill.

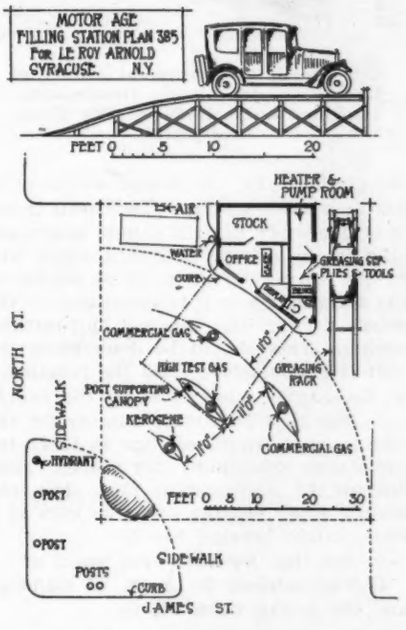
1—A mechanic or garagekeepers' helper does not necessarily have to have a chauffeur's license.

2—No; not for the purpose of testing cars.

3—The garagekeepers' lien law in Illinois took effect on June 27. I do not know anyone that had tested it out, but I am of the opinion it will be held valid when tested and it remains the law of the land until it is declared invalid. The law is given in the copy of the Illinois Session Laws for 1921. Any lawyer should have a copy of it or it should be from the Secretary of State.

4—The law applies to all warehouses and storage places for hire. If you store cars for pay, you are within this law. I would suggest that you might make a service charge, other than for storage for transit cars. You certainly would be exempt if you did not store cars for hire or pay. Of course, where you are repairing cars and do not charge storage you do not have to comply with this law. If in repairing a car you are forced to hold same on fault of the owner I think it would be proper to add storage charges and same would be collectable. The law is now in effect.

5—To preserve your lien under the statute where the car has been delivered, you must within 60 days from the date of such delivery file a lien notice with your county recorder. The latter should have the proper blanks to be filled out or should be able to tell you where to get them, or a lawyer can prepare them.



Plan 385—Suggestion for filling station layout and oiling and greasing rack

Filling Station Plan

A CORNER GASOLINE STATION WITH ACCESSORIES AND GREASING RACK
Plan No. 385

Q—Will you kindly give us some suggestions as to the erecting of a gasoline drive-in filling station.

The streets on the attached cut have been marked James and North for identification. James St. is level, 45 ft. wide, and has a double car track. There are, of course, a large number of cars that pass this location traveling on James St. only.

This location would seldom serve tourists, as it is more in the central part of the city, but would serve a class of trade much more permanent. One day, the latter part of October (a Friday), the cars passing a number of filling stations in that city were counted. The average number which passed the filling stations now in operation were 3000, while over 5000 passed the location under consideration.

The advisability of having installed in an out of the way spot on this lot, a stand suitable for placing cars when drawing off crankcase oil and for general greasing, has been considered, and your judgment on this would be appreciated.

On two of the corner lots at this location there are stores, on the third a dwelling, and the other one can easily be made vacant, as at present there are old wooden buildings there. There is nothing to prevent a station being erected, as far as the city ordinances are concerned.

Free air and water will be provided. It is possible four tanks will be installed: two 1500 gal. tanks for commercial gasoline; one 550 gal. tank for high-test gasoline, and one 550 gal. tank for kerosene oil.

It is thought probably as much as $4000 could be spent on the building and equipment. This amount, however, does not have to be held exactly, and your suggestions as to what best can be placed on this lot will help very much.—LeRoy Arnold, Syracuse, N. Y.

The biggest problem in making this layout is the finding of space where cars may take on air and water and where a greasing rack may be placed without interfering with or obstructing the passages to and from the gasoline pumps.

The driveways in our plan are very liberal but they should be so, as it is of the utmost importance to make it easy for customers to get in and out without interference. This building does not seem large but will be found to crowd the remainder of the appropriation after the necessary tanks and pumps are provided.

Your method of determining the probable trade is really the true way; there is no surer method of getting gasoline business than going where the traffic is heavy. A corner such as this where traffic passes both ways, especially around the corner, is the most valuable kind of a plot.

Motorists do not like to be taken out of their course and if they can cut across a corner and get gasoline at the same time, they think they are "killing two birds with one stone."

The greasing and oil changing branch is getting to be quite an important factor in motor car service and, if handled intelligently, should be a good source of profit.

A mistake is often made in planning filling stations even by experts of the big oil companies. Many times they place their free air hose so that a car taking on air will obstruct one of the passages. At ordinary times this does not matter, but during rush hours it matters considerably, since if there are several cars waiting, other prospective customers will go on to another station rather than stand in line.

SPEED OF MARMON TOURING CAR

Q—Would like to know what is the maximum speed of a Marmon 34, 1920, seven-passenger model.—J. Duran Boulard, Havana, Cuba.

The maximum speed of this model is 75 m.p.h.

BYPASSING THE COOLING WATER

Q—A Hudson, 1917 model, used for short runs in winter, does not develop enough heat, even with the radiator shutter closed, to function efficiently. By the time the radiator motometer reads "summer heat" and the engine begins to develop its normal power, it is necessary to stop, and the whole plant cools down again. Is there some bypass arrangement on the market to cut off the radiator?

2—Could one be rigged up as per sketch?

3—Would it be necessary to have two valves in the bypass line?

4—Where can such valves be obtained? —Dr. G. C. Briggs, suite 205, Wall bldg., Olive street, St. Louis, Mo.

1—None that we know of.

2—Yes.

3—Yes. A valve arrangement similar to the one shown in your sketch would be necessary.

4—This will be answered by letter.

COMPARISON OF SIX AND TWELVE VOLT SYSTEMS

Q—Why would not a six-volt system work as well as a 12-volt system on a Dodge car?

2—Why don't more cars use the silent chain drive type of generator?

3—What causes Dodge valves to burn around the edges, especially Nos. 1 and 8? —Lester Barris, Cressey, Mich.

1—A six-volt system could be used on the Dodge, but it would necessitate a large battery. With the silent chain drive to the crankshaft, the initial torque required is much greater than where the starter pinion engages with teeth on the periphery of the flywheel. In other words, the greater reduction obtained by the flywheel gear method permits a high torque by the use of a lower voltage than could be employed with the chain-driven method.

2—Usually where the two unit system is used, the generator is driven by a shaft which is fully as silent as the chain method.

3—This is caused by operating the engine at too low a temperature or by faulty gas distribution.

REPAIRING DODGE CLUTCH

Q—Describe how to install a thrust washer to remove the end play in a Dodge clutch shaft?

2—Give instructions for installing the springs to remove the rattle from the disk plates?

3—What are the New Departure numbers used in the clutch and transmission of a Dodge?

4—Has the Essex ever changed the size of exhaust valves?

5—Give sizes used on all models.— Harry Cunkle, Philipsburg, Pa.

1—An end play of ⅛ in. is permissible in the clutch and will give no trouble. If there is greater end play, these members should be removed, as in most cases most of this end play is in the transmission sliding shaft. Fig. 2, which is an illustration of the Dodge clutch and transmission, shows the location of the thrust plates, the renewal of which will eliminate entirely this end play. To install these, it will be necessary to dismantle the clutch and transmission unit, as follows:

Disconnect the front universal joint which will allow the drive shaft to drop down. Remove the bolts from the rear engine support and place a jack under the engine to hold it in place. Remove the battery and battery box. Loosen the exhaust pipe enough to permit sliding it over to one side. Move all of the bolts between the engine and clutch housing. The clutch release bearing has two small arms supporting it which must be released before the housing can be taken out. After these operations have been completed, the entire assembly can be removed and placed on the bench for further disassembly.

2—The springs, to prevent rattling of

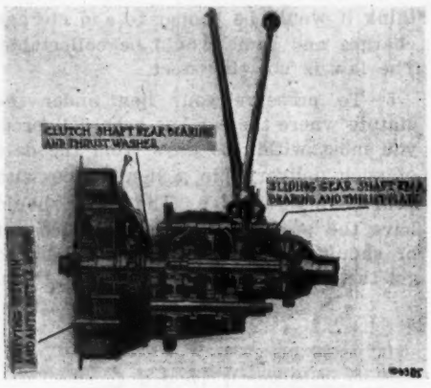


Fig. 2—Cross sectional view of Dodge clutch and transmission, showing the location of the thrust and plates

the clutch disks, are located on the driving disk studs or pins. To install these, it is necessary to drill a hole near each stud in the driving disk into which will fit the spring. This point is shown in the diagram where it is designated by the words driving disk pin and anti-rattling spring. This should be done when the unit is disassembled from the remainder of the engine while it is on the bench.

3—The New Departure number for the sliding gear front bearings is 1207; for the sliding gear shaft, rear bearing, 1308, and for the pilot bearing, 1304. The rear sliding shaft bearing on some cars is a Hess Bright bearing No. 308.

4—Not that we have ever heard of.

5—The exhaust is 1¾ in. in diameter and the intake valve 1⅞ in.

DIRECTION OF SECONDARY DISCHARGE

Q—In a Ford coil the high tension current follows the same path as the low tension between the commutator and the coil. This coil is nothing but a transformer, and authorities say that the current in the secondary winding travels the opposite direction to the primary. If that be true, how can a current of 12 to 27 volts travel a wire that has a current of 27,000 volts flowing in the opposite direction?—Clark & Shepard, Clay and Eighth streets, Hopkinsville, Ky.

At the time when the secondary spark is apparent at the spark plug, the secondary current is flowing in the same direction as the primary. Let us consider the action of the Ford coil: The Ford trembler coil is composed of an iron core "C," a primary coil "P," a secondary coil "S," a condensor "CO," and the vibrating or trembling device "T." The primary coil, which receives the primary or low tension current from the magneto or battery, whichever the case may be, is composed of from two to four layers of No. 20 insulated wire wound directly upon the iron core, which is made up of a number of soft iron wires.

The secondary coil which is wound over the primary is composed of 15 to 20,000 turns of about No. 40 silk or enamel covered wire, each layer being insulated from the preceding one. The condenser is a device which is used to absorb the primary current the moment that the primary circuit is broken, in order that the maximum efficiency may be obtained from the coil.

The action of the coil may be described as follows: the low tension current flows into the primary coil (p) and a magnetic field is immediately set up, which results in the iron core (c) becoming magnetized, the primary coil and core becoming an electro magnet. This core immediately attracts the vibrator spring (sp) to which the lower platinum point is connected in some manner (this differs in various makes of coils), and the primary circuit is broken. While the primary circuit rises to its maximum, a phenomenon known as induction takes place, wherein a current is inducted into the secondary coil. The current is of very high voltage and very low amperage and flows in a direction opposite to that of the primary current. This is the induced current (the spark has not as yet shown itself at the spark plug). When the primary circuit is now broken by the action of the vibrator, the secondary current again is reversed and flows now in the same direction as the primary current. This reverse impulse has about twice the value of the direct or first current that was INDUCTED into the secondary coil. If the primary was allowed to die out slowly, which it would do if the condensor were not used, the secondary current would also spend itself and lose much of its value; consequently, the faster the primary current can be brought to a stop, the higher the value of the secondary current.

The function of the condensor is to absorb the primary current at the instant the contact is broken by the vibrator, so that the highest maximum value can be obtained from the secondary current, and this value is highest, as previously stated, when the primary circuit is broken by the action of the vibrator. When the primary current is absorbed by the condensor, the high tension current seeks an outlet and, bridging the small gap between the platinum points, rushes to the spark plugs. The spark occurs at the time of the breaking of the primary circuit, not as the making. This action takes place in about 1-100 of a second and continues as long as the timer is in contact with the particular coil unit in which the cycle is taking place.

BOOKS ON RADIATOR REPAIRING

Q—Please advise where we may obtain books pertaining to the building and repairing of radiators.—G. W. Thompson, 2936 Cherry St., Kansas City, Mo.

We have sent you under separate cover a catalog of the U. P. C. Book Co., 239 West 39th st., New York City. In this catalog we have marked William's

and Pile's Automobile Repairman's Helper. This, we believe, is as helpful a volume as you will be able to find. We recommend that you read the article printed in the Nov. 3, 1921, issue of MOTOR AGE entitled "Radiator Maintenance." This, we believe, is a complete treatise on the subject.

REMODELING SMALL MOTOR

Q—Advise how to rewire a 6-volt direct current motor so that it can be run by a 110 volt alternating current line?—H. C. Chrisman, care Spencers Garage, Somonauk, Ill.

This would be considered impracticable because of the necessity of constructing a commutator, which is beyond the scope of the average shop.

DATA ON FRICTION DRIVE CAR

Q—Are there any other companies besides the Kelsey Motor Co. of Newark which are marketing a friction drive passenger car?

2—What are the friction losses in the conventional type of car from flywheel back, in high and low gear?

3—What are the friction losses in the Kelsey?—William Menewisch, Philadelphia, Pa.

1—We know of no other companies building or contemplating building such a type of car.

2—The friction losses in the conventional type of car in high gear amount to from four to nine per cent.

3—We have no data on this. This is a new car and we have not been supplied with any engineering specifications or features as yet.

COUNTERBALANCING CRANKSHAFT

Q—Could a counterbalanced crankshaft be installed in a Willys-Knight?

2—What would be the effect of such a change?

3—If this change were made, would it be better to install an entire new shaft or have the present one balanced?—H. L. Buttery, Wellington, Kan.

1—Yes.

2—A slight reduction in vibration. Many crankshafts are inherently counterbalanced, and to exterior appearance do not differ from a regular unbalanced shaft, except in the shape of the crank arms.

3—We would suggest that you communicate with some of the firms that make a specialty of balancing crankshafts.

CHARACTERISTICS OF NORTHEAST ELECTRICAL SYSTEM

Q—We desire some information regarding the Northeast generator on 1917 Dodge Brothers car. Does moving the third brush so as to increase the generator output increase the speed at which the generator reaches its maximum output?

2—Can the generator be made to reach its maximum output at approximately 30 m.p.h.? If so, how?

3—What effect would this change have on the voltage?

4—Could not excessive current output be avoided by inserting resistance in the field?

5—What effect would said changes have on the efficiency of the generator?—Harry D. Jones, Mica, Wash.

1-2-3-4 and 5—We wish to call your attention to a special article on the Northeast system as applied to the Dodge car which appeared in the December 1, 1921, issue of MOTOR AGE, on page 22.

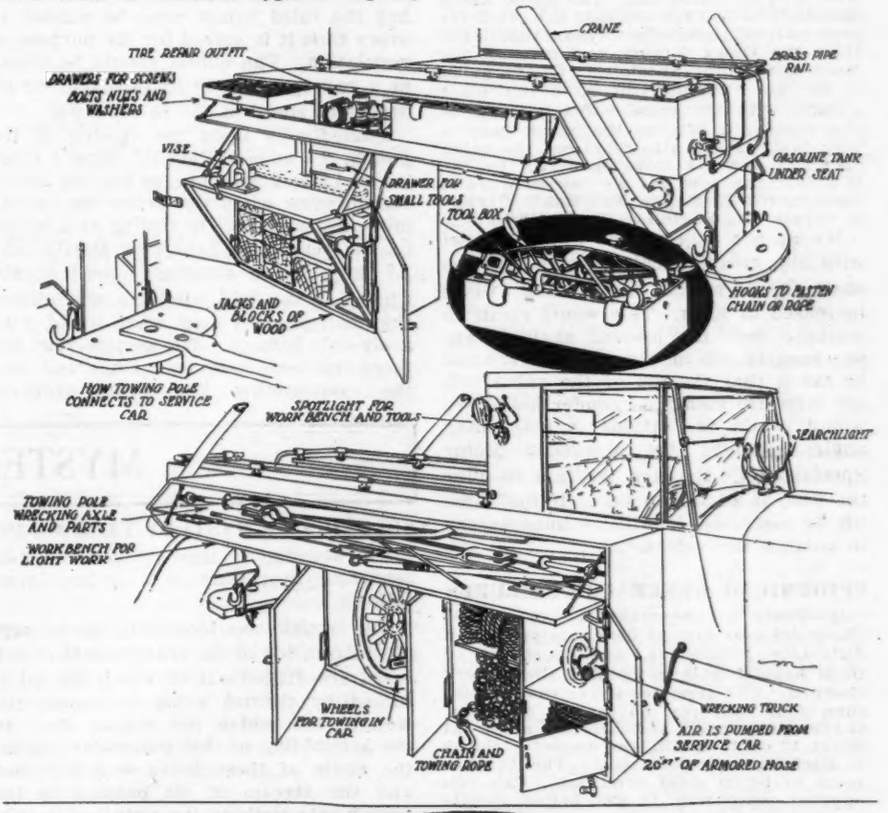
Suggested Service Truck Body on Hupmobile Chassis

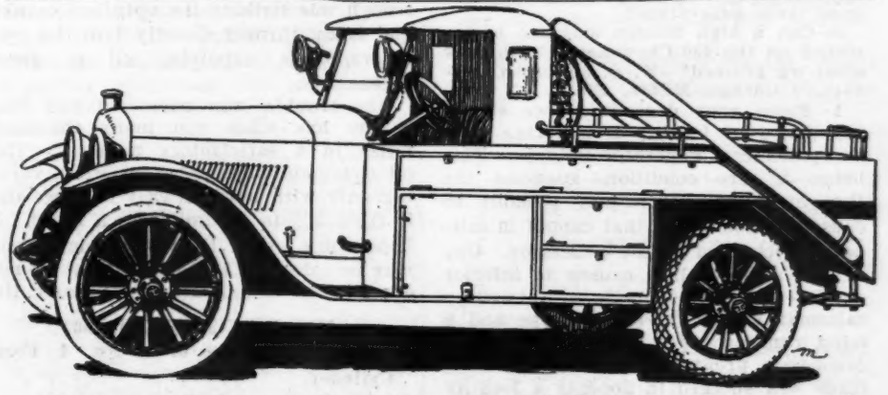
Q—Please plan a service truck body to be mounted on a Hupmobile series R chassis. We do general repair work so it will be necessary to have a crane to lift cars at the rear of the service truck. Mid-West Garage, 15 No. Mill street, Lead, S. D.

It is recognized now that the service car is a necessity. The equipment of service cars varies somewhat, but altogether the main items of equipment are applicable to every type. Herewith is shown a typical service car mounted on a Hupmobile chassis. The car with half or semi-elliptic springs is particularly adapted to service work. When a derrick or hoist are part of the equipment, it is practically necessary to use this, or the platform spring type of suspension. The bad feature of three-quarter elliptic suspension is the excessive range of compression of the springs before a real "bottom" for lifting is secured. Even with the recommended types of spring suspension, a jack should be placed under the frame to relieve the springs of the downward strains imposed by the hoist. The car, if it is to be used exclusively as a service car and is equipped for hoisting, should be fitted with a higher gear ratio to obtain the maximum of power. This, in the case of the car with large wheels, can be accomplished by reducing the diameter of the wheels or by replacing the gears in the rear axle. The largest tires available should be used. This pertains to cross sectional diameter.

The views of the car herewith shown will give some idea as to what equipment should be carried and what facilities should be provided for servicing the disabled car.

The equipment shown is very complete and can be varied to meet individual needs.


CRANE
TIRE REPAIR OUTFIT
BRASS PIPE RAIL
DRAWERS FOR SCREWS BOLTS NUTS AND WASHERS
VISE
GASOLINE TANK UNDER SEAT
DRAWER FOR SMALL TOOLS
TOOL BOX
HOOKS TO FASTEN CHAIN OR ROPE
JACKS AND BLOCKS OF WOOD
HOW TOWING POLE CONNECTS TO SERVICE CAR
SPOTLIGHT FOR WORK BENCH AND TOOLS
SEARCHLIGHT
TOWING POLE WRECKING AXLE AND PARTS
WORK BENCH FOR LIGHT WORK
WHEELS FOR TOWING IN CAR
CHAIN AND TOWING ROPE
WRECKING TRUCK AIR IS PUMPED FROM SERVICE CAR
20 FT. OF ARMORED HOSE



Service truck body mounted on a Hupmobile model R chassis with a crane at the rear. The compartments in this body facilitate the carrying of complete wrecking equipment

RADIATOR CLEANING SOLUTION

Q—Supply the formula of soda and water to clean the inside of radiators and water jackets.—D. L. B., Prairie Du Sac, Wis.

Dissolve 1½ lbs. of common washing soda in two gallons of water. Make enough of the solution in this proportion to fill the radiator completely. The solution should be used hot, and therefore it would be a good idea to remove the fan belt to keep the solution hot while the engine is running.

If the cooling system has a pump, allow the engine to run about ten minutes. The solution should be drained and the radiator filled with clear soft water. It is probable that one treatment of this kind will remove the deposits completely, but the same process can be repeated within a few days. In very bad cases an acid solution can be used .

CONSTRUCTING RACING CAMSHAFT

Q—I want to secure a camshaft made with a ⅝-in. valve lift. The stock Essex camshaft is .325 for exhaust and .3125 for inlet valves. I have a forging that I got from the Essex factory and can get the Muskegon Motor Specialties Co. to grind it for me. Would you have the shaft ground with the same valve opening as the regular shaft, as the stock cam is very fast? I can also ream out the valve openings and get more opening; the car is a fast one now but we can improve it some more.—E. Baker, The Baker Garage & Supply Co., Saginaw, W. S., Mich.

We do not believe that you will meet with any great difficulty if you have the shaft ground so that the opening will be increased to ⅜ in. This would mean an increase over the present shaft of approximately .045 in. Care, however, must be taken that the top of the valve will not interfere with the cylinder head. We would retain the original valve timing angle, although the Muskegon Motor Specialties Co. is in a position to offer the best of advice on this. If the valve lift is increased it will be unnecessary to enlarge the valves.

EPIDEMIC OF GENERATOR FAILURES

Q—There are several 1920 model 490 Chevrolet cars around here, equipped with Auto-Lite generators, and most all of them have trouble in keeping the battery charged. The ammeter never shows more than four amperes, no matter how fast the engine runs, and driving along at about 12 or 15 m.p.h., the ammeter shows a discharge all the time. The brushes seem to be in good condition. Can you suggest some way to get better results from these generators?

2—Can a high tension magneto be installed on the 490 Chevrolet? If so, how shall we proceed?—W. O. Jernagan, Jernagan's Garage, Milton, Fla.

1—From your description we should say that your locality is suffering from an epidemic of generator failures. This being a rare condition, suggests the thought to us that it may possibly be caused by something that cannot in fairness be charged to the generator. One of the most prolific causes is inferior quality brushes. Sometimes a hustling salesman of the "go-getter" type and a mind running more to the securing of immediate profits than the good of his trade will succeed in flooding a locality with low-grade brushes and other automotive electrical apparatus. When this occurs the invariable result is an aftermath of dissatisfaction until the inferior parts are used up or discarded.

The foregoing is not to be construed as a wholesale condemnation of replacement parts. Such a stand would be unfair to many manufacturers who are producing parts of excellent quality. It is merely given as a warning that the trade may exercise due caution in purchasing. With the above suspicion in mind, we recommend that you procure a small stock of genuine brushes from either the Chevrolet Motor Co. or the Electric Auto-Lite Co., and install them as rapidly as the cars are brought to you.

As you probably know, merely installing brushes is not sufficient. They must be sanded in carefully by placing No. 00 sandpaper (not emery cloth, under any circumstances) between them and the commutator, and side cut and drawing it back and forth for a half dozen or more strokes, at the same time keeping a light pressure on the brushes. Not only must this be done at the time of installation, but the third brush must be sanded in every time it is moved for the purpose of regulation. The cutout should be closed at a car speed of 10 to 18 m.p.h., or an armature speed of 550 to 600 r.p.m.

Immediately upon the closing of the points, the ammeter should show a reading of 1.5 amperes charges and the points should open when the meter shows one ampere discharge. In testing as a motor on the bench, the generator should take 2.7 amp. at an armature speed of 450 r.p.m. If the field windings are normal they will pass 1.7 amp. when tested with a six-volt battery. We assume that the foregoing tests have been made and that the commutator has been properly dressed by truing up, undercutting the insulation and polishing with fine sandpaper. The charging rate is regulated by moving the third brush counterclockwise to increase the charging rate, and in the opposite direction to decrease it. (This is when viewing the armature from the commutator end.)

2—The installation is very difficult, as the only driving point available is the end of the generator shaft. It will be necessary to cut away the igniter drive housing and equip the end of the shaft with a sprocket or gear for a silent chain. The magneto will then have to be mounted on a special bracket and lined up in such a way that the chain will run true between it and the generator shaft. In view of the age of the cars, we recommend that the installation be not attempted.

AXLE USED IN EMPIRE 1917 SIX

Q—Can you tell us what kind of rear axle and transmission is used in the Empire Six, 1917, and what other make of cars same will fit?—Auto Parts Co., S. Griesley, Nashville, Tenn.

This is a Weston Mott axle and will fit the Oldsmobile model 43, the Davis model H, and all models of the Dort.

SLACK FAN BELT BETTERS ENGINE'S COLD WEATHER PERFORMANCE

Now that the cold weather is approaching, fan belt adjustment can be backed off with benefit. A slack belt and a partially blocked off radiator will do much to keep the engine temperature to the most efficient point and thus make for smooth running and economy.

MYSTERY TALES

SOLUTION OF MYSTERY TALE No. 109

The solution to Mystery Tale No. 109, regarding overoiling in a Dodge, is as follows:

The trouble was located in the oil supply tube inside of the crankcase in which holes are drilled out of which the oil is forced by the oil pump to supply the trough into which the cranks dip. In the assembling of this particular engine, the angle of these holes was incorrect and the stream of oil passing to the trough was striking the upturned cranks and being thrown directly into the cylinders, thus supplying oil in great excess.

The trouble was corrected and this engine has since run many thousand miles in a satisfactory manner. The oil consumption remains constant, varying only with hard or easy driving, and is from 250 to 300 miles to a quart. I hope some other Dodge trouble owner may be taken off the hospital list by my experience. Edgar Gifford, Chicago, Ill.

MYSTERY TALE NO. 106
The Queer Failure of a No. 4 Ford Cylinder.

Q—We recently worked on a Ford engine which every time you advanced the spark would cut out on No. 4 cylinder. With the spark retarded, all four cylinders would fire perfectly and the engine would throttle down just as fine as any engine. On the road under a pull all the cylinders would fire perfectly. With the car standing and the engine running, No. 4 cylinder would cut out if the spark was advanced. The coil would vibrate regularly and a good spark could be drawn from No. 4 plug, but there was no explosion in No. 4 cylinder with the spark advanced. We put in an oversize piston, new step-cut rings, a new timer, a new carbureter, ground the valves, examined the valve springs, put in a new spark plug and a new K. W. coil. None of the foregoing changes did any good.—W. E. Price, Jasonville, Ind.

You neglected to state whether the engine would run smoothly under a pull with the spark advanced. We rather imagine that it did. It is not at all unusual for a cylinder to seem to cutout when running idle on a low throttle with the spark advanced. The failure is only seeming, for in reality every shot is being fired, though considerable weaker than the explosion in the other cylinders. This can usually be attributed to one of three things, either a slight inequality of mixture distribution, a slight air leakage around the intake valve stem, or to a too close setting of the spark plug gap. The three foregoing suggestions may or may not solve the riddle, and the opinions of mystery tales readers are solicited.

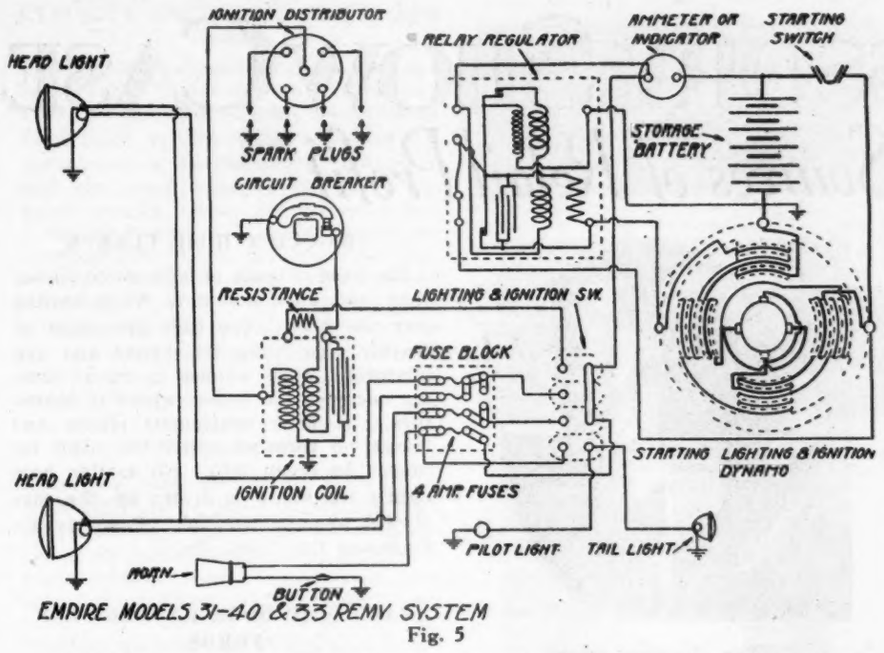


Fig. 5

WIRING EMPIRE MODEL 31

Q—Publish a wiring diagram of an Empire model 31.—J. M. Learn, Jr., care The Boston Hotel, St. James, Minn.

The wiring diagram of the model 31 Empire is shown in Fig. 5.

IMPRACTABILITY OF REPAIRING BATTERY PLATES

Q—The filler on the positive plates of my storage batteries is badly chipped off, while the lead part of the plate seems good. Can you supply me with a formula for mixing new filler to plaster on the positive plates?

2—The negative plates?

3—Is this advisable—that is, will the batteries so repaired do their work?

4—Where can I get a torch for battery work that I can use with a Prestolite or Searchlight tank?—Tagus Garage Co., Tagus, N. Dak.

1—Formulas for the material of battery plates are procurable but are not recommended as a remedy to repair broken down plates. To derive any results from any of these formulae it is necessary that all the positive and negative plates be built up of the same material. The composition of the plate of the storage batteries manufactured today are trade secrets and are not easily obtainable.

2—Refer to answer question No. 1.

3—Refer to same question.

4—The names of makers of these torches will be supplied you by letter.

CONTRACT MACHINE WORK

Q—Publish diagram of a Pfanstiehl vibrator, as used on a Curtiss Airplane engine equipped with two Dixie magnetos.

2—What effect does the three piece ring with spring, such as the Rebco and Pressure-proof ring, have upon the cylinder walls? We have had and heard discussions pro and con—they produce excessive wear, and cylinders have to be reground a good deal oftener than those equipped with a one-piece ring.

3—Have you described in MOTOR AGE in any previous issue a home-made rectifier to be used with AC current for charging batteries?

4—What kind of an automatic cutout would you recommend to be used with the forgoing rectifier, to break up the circuit when the outside current is shut off. We get current here from sunset to sunrise. We wish some device to protect the batteries after being on the line all night.

5—We intend to put in a small machine shop and would like to know how to go about getting some machine work from manufacturers who let out contracts this way to small shops. In this way we expect to keep busy all winter, especially during the slack period.—Sam's Repair Shop, Provincetown, Mass.

1—We are unable to supply a diagram of this circuit. This device must have been added by some mechanic, as the regular equipment on the Curtiss engine does not include the Pfanstiehl vibrator. A booster magneto, which is nothing more than a hand-revolved magneto, was used as regular equipment on this engine for easy starting. It is far more efficient than the system wherein batteries are used and is safer for the man who is to crank the propeller.

2—It is not within the scope of MOTOR AGE to discuss the relative merits of devices used on automobile engines. There are things for and against the patented ring. The best criterion of the quality of a piston ring is the company it keeps; in other words, the ring used by the leading manufacturers of a high grade car should be a good ring.

3—No.

4—Usually the automatic circuit breaker is a part of the rectifier. We are supplying by mail the name of the firms supplying directions for constructing one of these rectifiers.

5—We would suggest that you communicate with Mr. Arnold, care Automotive Industries, Class Journal Publishing Co., 239 W. 39th St., New York, N. Y.

PROPELLOR DIMENSIONS

Q—We are planning on building a motor sled weighing around 300 lbs., using a Monroe, model 16, No. 1338 engine to drive the propeller. Would like to know the curve, or at what speed this engine will develop the most power for this work. Instead of cutting down the flywheel, as you recommended in your last MOTOR AGE, we intend to build an air propeller and use a Ford flywheel, discarding the magnets and balancing it up well, using a Ford carbureter right on the cylinder head.

2—Would it be advisable to set the camshaft ahead any for this work, and how much if any?

3—What size and pitch of propeller would you recommend for this work and where can this be procured? Also other fittings and accessories for same?—John Schmill, H. M. S. Motor Co., Manitowoc, Wis.

1—Although we have no power curve data on this engine, it is our belief that this engine develops about 22 hp. at 1,700 r.p.m.

2—We would not advise any change in the valve timing setting of this engine.

3—A propellor of 3 to 3½ foot pitch and 5½ foot diameter would be ample size to hold this engine to 1,400 r.p.m. The rest of this question will be answered by mail.

HORSEPOWER AND GEAR RATIOS

Q—Publish the power curve of the Oakland light six.

2—Publish power curve of the Willys-Knight.

3—What is the gear ratio on third speed of the Willys-Knight?

4—What is the highest horsepower and crankshaft speed the 1922 model Maxwell will deliver? Also, what is the gear ratio?—Helsopple Bros., Hooversville, Pa.

1—The power curve of the Oakland light six is shown in Fig. 6.

2—The power curve of the Willys-Knight is shown in Fig. 7.

3—The gear ratio on direct of the Willys-Knight is 5 to 1.

4—The horsepower and the maximum revolutions in this engine are not available at present. The gear ratio is 4 5-9 to 1.

DOUBLE EXHAUST HEADERS

Q—Can you advise me concerning the name and address of a reliable concern manufacturing a double exhaust system for 1921 Buick six, and the approximate cost of same?—Fred Kreyssig, Haydenville, O.

We know of no double exhaust system that is being manufactured for the Buick.

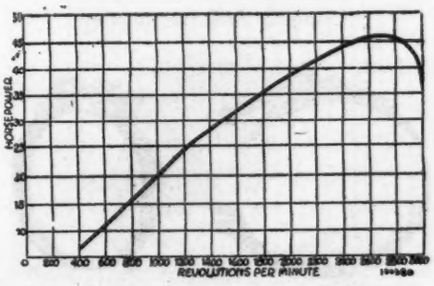


Fig. 6—Power curve of the Oakland light six

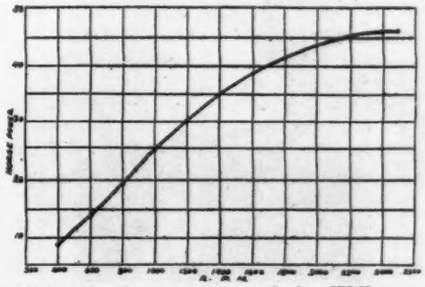


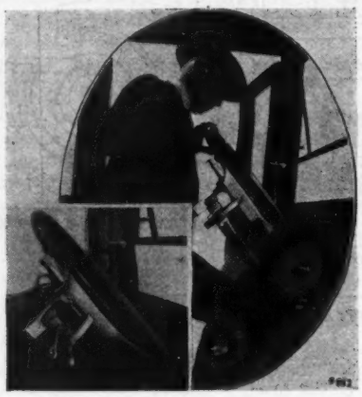
Fig. 7—Power curve of the Willys-Knight

The ACCESSORY SHOW CASE

New Sources of Retail Profit

NU-WAY CLEARANCE WHEEL

The release pin of the Nu-way clearance can be operated without taking the hand from the steering wheel. This permits the wheel to be tilted upward and slide forward and downward, allowing the driver to get out of the car unobstructed. Another feature of this wheel is the locking arrangement. It is so designed that, when tilted forward, a padlock can be inserted through the holes provided in the upper and lower castings, making it impossible to drive the car. It is made for five cars: Ford, Maxwell, Chevrolet, Overland 4 and Dodge. Price $9.80 for Fords and $10.60 for the others. Mott Mfg. Co., Adrian, Mich.

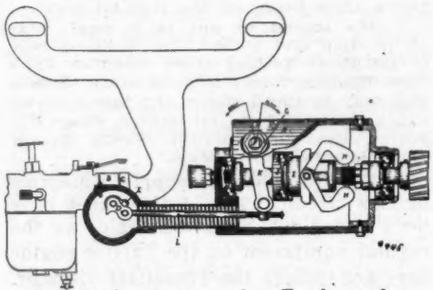


Nu-Way clearance wheel

STANDARD GOVERNOR FOR FORD TRUCKS

The Standard governor for Ford trucks is designed to operate from the camshaft and actuates the throttle when excessive speed is approached. The diagram on this page shows the principle of its operation.

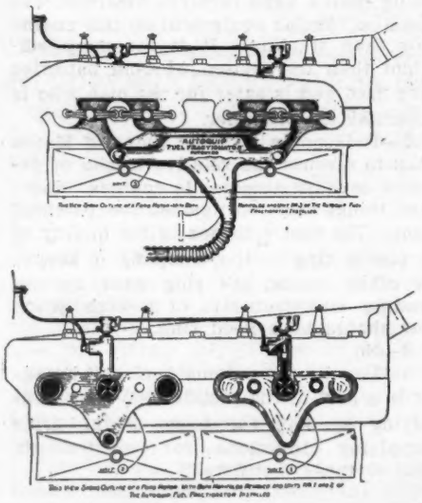
The action of the governor is as follows: weights "H" and "H" are expanded, moving sleeve "I" and ball cup "J" to the left, moving pendulum cam "K" and throttle rod "L" which connects with throttle lever "D," closing it and making impossible speed above a certain mark. Price $25. Kokomo Brass Works, Kokomo, Ind.



Standard governor for Ford trucks

AUTOQUIP FUEL FRACTIONATER

The Autoquip Fuel Fractionater is composed of three units. It is installed by detaching the manifold from the cylinder block, and placing units one and two against the cylinder block (see illustration). The manifold is then put back in place and unit three attached over the intake manifold. The device, it is claimed, breaks up the fuel particles in two ways: First, the pressure vacuum created by the spiral blades; second, these blades are heated by the exhaust flames to a high temperature, thus vaporizing the fuel globules that come into contact with them. Autoquip Mfg. Co., Rochester, N. Y.



Autoquip fuel fractionater

ON-QUICK HOSE CLAMPS

The band is made of cold rolled spring steel and does not kink when sprung over the hose. The ears are made of heavier steel than the bands and are reinforced, spot welded to band. The nut occupies the recess where it cannot turn. It is a continuous clamp and leaves no recesses under the band for rubber to creep into. No matter how tightly the screw is drawn up, the ears always remain parallel. Pennsylvania Stamping Co., York, Pa.

BALL GRIP DOOR HANDLES FOR FORDS

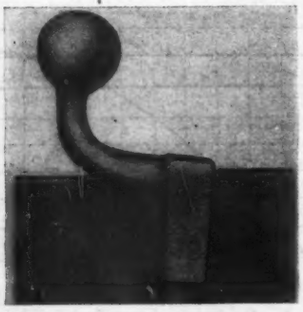
These nickel plated ball grip door handles for Fords are intended to facilitate the opening of the doors. They are attached by slipping over the standard handle and tapping lightly with a hammer. No screws or bolts are required. C. L. Loomis Mfg. Co., 428 Liberty street, Peoria, Ill.

MOORE CAR WARMER FOR FORDS

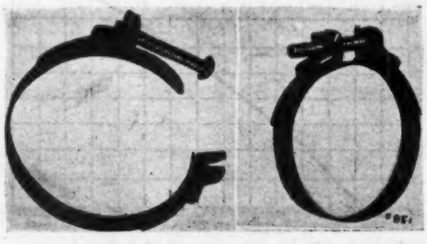
This is a device designed to be placed around the exhaust pipe of the Ford engine to carry the air thus heated to the body of the car by means of an outlet protruding through the dash. A control damper shuts off the heat when not wanted. Price $2.50. Moore Mfg. Co., Waterloo, Ia.

GEMCO BAR-OIL PLUGS

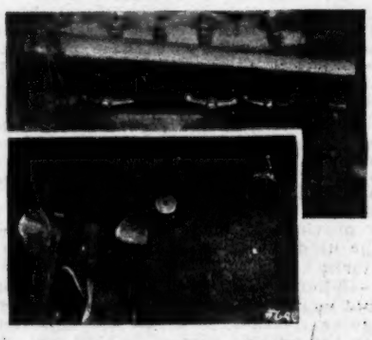
These plugs are combustion chambers into which the spark plugs are screwed in the usual manner. In each chamber are two baffle plates which prevent the oil from reaching the firing points. A priming feature is included in the ½ in. sizes, the ½ in. standard, selling at $1, and the ⅞ in., at $1.25. Gemco Mfg. Co., Milwaukee.



Ball grip door handles for Fords



On-quick hose clamps



Moore car warmer for Fords

PYROMITE ADJUSTABLE VALVE FOR FORDS

This is an adjustable intake and exhaust valve which can be put on any Ford. It is different from the ordinary Ford valve in that it has a slotted adjusting nut on the end of the valve stem, this nut being clamped rigidly to the valve stem by means of a clamping nut. A special washer with a rectangular depression into which the valve pin fits, prevents the valve from turning when adjusting. It is made of a special alloy steel known as "Pyronite," which it is claimed resists pitting and is practically unbreakable. Steel Products Mfg. Co., Racine, Wis.

CUSHION-COILS

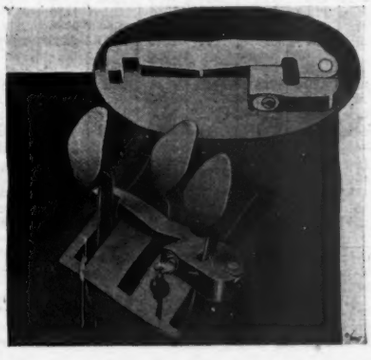
A shock absorber for the Ford car is made entirely of steel stampings with brass bushings and is provided with oilers at all moving points. It is finished in black enamel. Under compression, each coil of the absorber telescopes inside another. To check all upthrow, a special shoulder arrangement in the arch levers of the Cushion-Coils comes in contact with the under side of the Ford leaf spring at the instant of rebound, thus giving an automatic snubbing action. Price $2. The Pressed Metal Mfg. Co., Waukesha, Wis.

HANKEE SAFETY SIGNAL

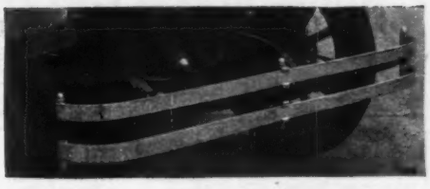
This traffic signal is in the form of illuminated arrows attached to the sides of the windshield and operated from a button on the steering wheel. The signal is actuated by a rotating electric motor inside the signal. A push of the button operates the signal up or down, illuminating the red arrow when down. Double set, comprising left and right signals, $24. Single set, left hand signal only, $12.50. Naser Electric Co., Minneapolis.

FRANCISCO HOT BLAST HEATER

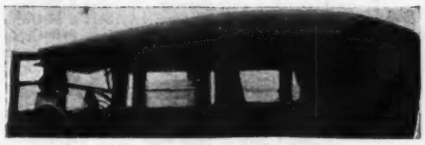
This device surrounds the exhaust and intake manifold. The air entering through the radiator passes over the hot exhaust pipe and is carried into the car. Made for about 30 makes of cars and can be applied to all Continental 7R and Herschell-Spillman engines. Francisco Hot Blast Heater Mfg. Co., 1060 Mt. Pleasant avenue, Columbus, O.



Pedal lock for Fords



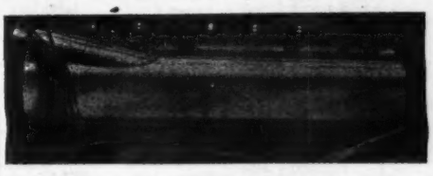
C. G. bumper



Badger Deluxe all-season top, manufactured by the Wisconsin Top Co., Inc., Racine, Wis.

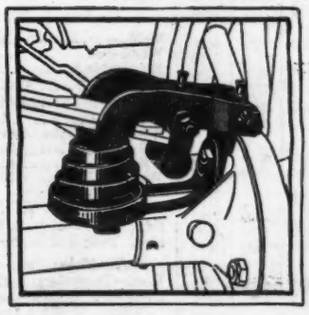
Express spark plug

Pyromite adjustable valve for Fords



Francisco hot blast heater

Hankee safety signal



Cushion-coils

PEDAL LOCK FOR FORDS

This Ford lock is composed of two drop forgings. The shorter arm contains the lock. The long arm is threaded between the foot pedals much the same as you would thread a pencil between your fingers. To attach the lock, push forward the reverse pedal, slip in the long arm, holding the side with the short arm attached upward. When the notch on the long arm comes in contact with the "shift" pedal, pull the lock downward into position. The manufacturers claim that a Ford locked with this device can only be moved by jacking up the car and towing it backwards. Tiller Lock Co., Kansas City, Mo.

EXPRESS LINE OF SPARK PLUGS

The deep, full-length slot in the slanting lower electrode of the Express plug, it is claimed, draws oil away from the firing points by capillary action, and gravity forces it to run off the lower end.

There are four types of Express spark plugs—all made with the distinctive blue-headed insulator. Each type comes in several sizes of thread and length to meet the installation requirements and operating condition of standard engines.

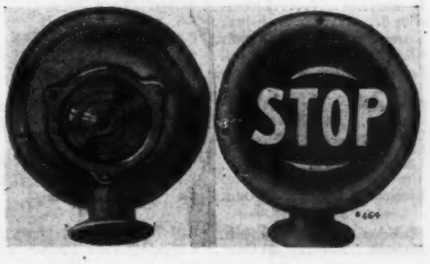
The patented design provides both easy cleaning and an absolutely gastight joint by combining bushing, gaskets and insulator in a single piece. Express Spark Plug Co., Inc., Alexandria, Va.

C. G. BUMPER

The new C. G. bumper is of truss construction. It is made of the best grade carbon spring steel, having two front bars and a main bar, bolted together at the ends and bolted and clamped in the middle. It is made in three sizes to accommodate different types of cars. Series 70 is of two-inch steel throughout, series 80 is of 1¾ inch steel, while series 90 is a 1¾ inch main bar and 1⅛ inch front bar. These are finished in black or nickel. C. G. Spring Co., Kalamazoo, Mich.

VICTORY SIGNAL AND PARKING LIGHT

This is a combined traffic stop signal and parking light. It is made of polished aluminum with a heavy ruby glass. It lights automatically when the brake pedal is pressed down. Price $7. Installation $2. Victory Signal & Parking Light Co., 2008 South Eighth street, St. Louis.



Victory signal and parking light

Specifications of Current Passenger Car Models

NAME AND MODEL	Engine Make	Cylinders, Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan
Ambassador.....R	Cont..	6-3⅝x5¼	136	33x5	....	†4500	$4500	....	$6500
American.....C	H-S...	6-3¼x5	127	32x4	$2195	2195	†2250	....	3150
Anderson.....Series 40	Cont..	6-3¼x4½	120	33x4	2195	1650	1795	$2450	2550
Apperson. 8-21-S	Own..	8-3¼x5	130	34x4½	...	3000	3250	4500	4500
Auburn.....6-51	Cont..	6-3¼x4½	121	32x4	1670	1695	1760	2475	2495
Auburn.....Beauty Six	Cont..	6-3¼x4½	121	32x4½	....	†2195	....	....	....
Beare.....20T	Cont..	6-3¼x4½	120	33x4	1775	1520	....	2320	2420
Bell.....4-32	H-S...	4-3½x5	114	31x4	....	1495	....	....	....
Bell.....6-50	H-S...	6-3¼x5	124	32x4	....	1695	....	....	....
Biddle.....B1 & B5	Buda..	4-3⅜x5½	121	32x4	3475	†3475	....	4350	....
Brewster.....91	Own..	4-4 x5½	125	32x4½	†7000	7000	....	....	10500
Briscoe, 4-34	Own..	4-3⅜x5	109	31x4	1085	1085	....	1685	1685
Buick. 1922-34-35-36-37	Own..	4-3⅝x4¾	109	31x4	895	935	....	1295	1395
Buick.....1922-44-5-6-7	Own..	6-3⅜x4½	118	33x4½	1360	1395	....	1885	2065
Buick.....1922-48-9-50	Own..	6-3⅝x4½	124	34x4½	....	....	1585	2075	2375
Cadillac.....61	Own..	8-3½x5½	132	33x5	3100	3100	3150	3925	4100
Case.....X	Cont..	6-3¼x4½	122	32x4½	...	1890	....	....	2790
Chalmers.....6-30	Own..	6-3¼x4½	117	32x4	1245	1295	....	1995	2295
Chalmers.....6-30	Own..	6-3¼x4½	122	33x4½	....	....	1395	....	....
Champion.....Tourist	Lyc...	4-3½x5	113	32x3½	....	995	†995	....	....
Champion.....Special	H-S...	4-3½x5	118	32x4	†1195	1195	....	....	....
Chandler.....Six	Own..	6-3½x5	123	33x4	1785	....	1785	2785	2885
Chevrolet.....490	Own..	4-3¼x4	102	30x3½	525	525	....	875	875
Chevrolet.....FB	Own..	4-3¼x5¼	110	32x4	975	975	....	1575	1575
Cleveland.....40	Own..	6-3 x4½	112	32x4	1295	1295	....	2195	2295
Climber Four.....K	H-S...	4-3½x5	115	33x4	1385	1385	....	....	....
Climber Six.....S	H-S...	6-3½x5	125½	32x4½	2250	2250	....	3000	3100
Cole.....890	Nort.	8-3½x4½	127¼	33x5	2485	†2485	2485	3385	3685
Columbia Challenger....	Rut..	6-3½x5	115	32x4	....	1195	....	†1995	1995
Columbia.....D-C&CS	Cont..	6-3½x4½	115	32x4	1475	1475	†1475	†2295	2350
Comet.....C-53	Cont..	6-3½x5¼	125	33x4½	....	2350	2450	....	3650
Commonwealth.....44	H-S...	4-3½x5	117	32x4	....	1395	....	....	2465
Crawford.....22-6-40	Cont..	6-3½x5½	122½	32x4	3000	3000	3000	....	4500
Crow-Elkhart....L63-65	Lyc...	4-3½x5	117	32x3½	‡1295	1295	....	....	....
Crow-Elkhart....S63-65	H-S...	6-3¼x5	117	33x4	‡1545	1545	....	....	2395
Daniels.....D-19	Own..	8-3½x5¼	132	34x4¼	‡5350	†5350	5350	6250	6950
Davis.....61-67	Cont..	6-3¼x4½	120	33x4½	†1895	1795	†2050	2595	2595
Dixie Flyer.....H-S-70	H-S...	4-3½x5	112	32x4	1195	1195	†1395	1895	1895
Dodge Brothers.....	Own..	4-3⅞x4½	114	32x4	935	985	....	1585	1785
Dorris.....6-80	Own..	6-4 x5	132	33x5	....	†4785	4785	5800	7190
Dort.....19-14	D-Ly.	4-3½x5	108	31x4	985	985	....	1535	1685
Driggs.....	Own..	4-2⅝x4½	104	30x3½	1275	1275	....	....	1975
Duesenberg...Straight 8	Own..	8-2⅞x5	134	33x5	6500	6500	6750	7800	7800
Du Pont.....A	Own..	4-3⅜x5½	124	32x4½	3400	†3400	....	4500	4900
Durant.....A-22	Own..	4-3½x4½	109	31x4	....	890	....	1365	1365
Durant.....B-22	Own..	6-3¼x4½	123	32x4½	1600	1650	....	2250	2400
Earl.....40	Own..	4-3 7/16x5¼	112	32x4	1375	1285	....	....	1995
Elcar.....K-4	Lyc...	4-3½x5	117	33x4	†1145	1145	‡1145	1545	1645
Elcar.....7-R	Cont..	6-3¼x4½	117	33x4	†1595	1595	‡1595	2395	2495
Elgin.....K-1	Falls..	6-3½x4¼	118	33x4	1595	1495	†1595	2395	2395
Essex.....	Own..	4-3½x5	108½	32x4	1095	1095	....	1345	1895
Falcon.....4	Own..	4-3½x5	115	32x4	1295	1295	....	1990	2085
Falcon.....6	Own..	6-3½x5	115	32x4	1595	1595	....	2295	2395
Falcon, H.P.M...12-D22	Own..	4-2⅞x4	100	27x3½	2800	†3000	....	....	4000
Fergus.....S-5-21	Own..	6-3¼x5	126	33x4½	....	Chassis	Price	$5000	....
Ferris.....Series 60	Cont..	6-3½x5¼	130	32x4½	2695	....	**2595	....	3695
Ferris.....Series70	Cont..	6-3⅝x5¼	130	32x4½	2895	....	2795	....	3895
Ford.....T	Own..	4-3¾x4	100	30x3½	**325	††355	....	595	660
Franklin.....9-B	Own .	6-3¼x4	115	32x4	2300	2350	....	2650	3350
Gardner.....T-R & G	Lyc...	4-3½x5	112	32x3½	1095	1095	....	....	1695
Grant.....Special	Own..	6-3½x4½	116	32x4	1285	1285	....	1950	1950
H.C.S.....	Weid.	4-3⅝x5½	120	32x4½	2725	†2775	....	3450	3650
Handley-Knight.....	Kn'ht.	4-4½x4½	125	32x4½	....	....	2850	4150	4150
Hanson Six.....60	Cont..	6-3¼x4½	121	32x4	1795	1795	1995	†2775	2885
Hatfield.....A-42	H-S...	4-3½x5	115	32x4	†1495	1495	....	....	2395
Haynes.....75	Own..	6-3½x5½	132	34x4½	2598	†2395	‡2395	....	3395
Haynes.....55	Own..	6-3½x5	121	33x4	1645	1595	....	2295	2595
Haynes.....48	Own..	12-2¾x5	132	34x4½	4200	3635	3635	....	4950
Helmes.....Series 4	Own..	6-3½x4¼	126	34x4½	†2950	....	2950	3850	4150
Hudson Super 6.....	Own..	6-3½x5	126	34x4½	†1695	....	1745	2570	2570
Huffman.....R	Cont..	6-3¼x4½	120	32x4	1845	1795	....	....	2795
Hupmobile.....Series R	Own..	4-3¼x5½	112	32x4	1250	1250	....	2100	2150
Jackson.....638	Cont..	6-3¼x4½	121	32x4½	†2285	1635	....	2985	2985
Jordan.....MX	Own..	6-3⅝x4¾	120	32x4	2095	2095	....	3200	3200
Jordan.....F	Cont..	6-3½x5½	127	32x4½	....	....	2475	....	3500
Kenworthy.....8-90	Own..	8-3 x5¼	13?:	32x4½	5000	5000	5250	6000	6000
Kessler.....K	Own..	4-3¾x3¾	117	32x4	....	1995	....	....	2445
King 8.....J	Own..	8-3 x5	120	32x4½	2140	†2125	**2125	3125	3235
Kissel.....65	Own..	6-3⅝x5½	124	32x4½	2075	†2975	2475	†3775	*3775
Kline Kar.....6-55-K	Cont..	6-3¼x4½	121	33x4	1890	1890	1890	3050	3090
Kurtz Automatic.....A	H-S...	6-3¼x5	122	32x4	....	2050	....	....	3000
LaFayette.....134	Own..	8-3½x5½	132	33x5	4850	4850	4850	6250	6500
Leach.....999	Own..	6-3⅝x5½	134	32x4½	6500	6500	6500	6500	6500
Lexington.....Series S	Anst.	6-3¼x4½	122	32x4	....	2100	....	....	2785
Lexington.....Series T	Anst.	6-3¼x4½	128	32x4½	....	....	2785	....	3750
Liberty.....10-C	Own..	6-3½x5	117	32x4	1595	1595	†1675	2400	2495
Lincoln.....	Own..	8-3⅝x5	136	33x5	†4600	4300	4300	4950	5400
Locomobile.....48	Own..	6-4½x5½	142	35x5	....	†7600	7600	10500	11000
Malbohn.....B	Falls..	6-3¼x4¼	116	32x4	1395	1395	†1595	2295	2295
Marmon.....34	Own..	6-3⅜x5½	136	32x4½	4185	†3985	3985	4875	5275

NAME AND MODEL	Engine Make	Cylinders, Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan
Maxwell.....1921	Own..	4-3½x4½	109	31x4	$ 885	$ 885	....	$1385	$1485
McFarlan.....1921	Own..	6-4½x6	140	33x5	6300	†6300	$6300	7500	7500
Mercer.....Series 5	Own..	4-3¾x6¾	132	32x4½	3950	†3950	*3950	4850	5250
Merit.....	Cont..	6-3¼x4½	119	32x4	†1985	1985	....	....	....
Meteor.....R & RR	Dues..	4-4½x6	129	32x4½	5500	5500	....	....	....
Mitchell.....F-50	Own..	6-3½x5	120	33x4	‡1490	1490	†1790	2290	2440
Mitchell.....F-50	Own..	6-3½x5	127	33x4	....	....	1795	....	....
Monroe.....S-9 & 10	Own..	4-3¼x4½	115	32x3½	1295	1295	....	....	....
Monroe.....S-11 & 12	Own..	4-3¼x4½	115	33x4	....	....	....	2075	2175
Moon.....6-48	Cont..	6-3¼x4½	122	32x4	1785	1785	2285	2785	2785
Moon.....6-68	Cont..	6-3½x5¼	125	32x4½	....	....	2285	....	....
Murray-Mac Six.....	Own..	6-3½x5½	128	34x4½	4250	4250	4250	....	....
Nash.....681-7	Own..	6-3¼x5	121	33x4	1525	1545	†1695	2395	2695
Nash.....682	Own..	6-3¼x5	127	34x4½	....	....	1695	....	....
Nash Four.....41-4	Own..	4-3⅝x5	112	33x4	1025	1045	....	1645	1835
National Sextet.....BB	Own..	6-3½x5½	130	32x4½	2990	†2990	2990	4140	4240
Noma.....3C	Cont..	6-3¼x4½	128	32x4½	2000	†2100	*2200	....	3200
Noma.....1D	Cont..	6-3½x5¼	128	32x4½	3250	†3350	*3450	....	5500
Norwalk.....430-KS	Lyc...	4-3½x5	116	32x3½	....	1035	....	....	....
Oakland.....34-D	Own..	6-2 11/16x4¾	115	32x4	1095	1145	†1265	1625	1725
Ogren.....6-T	Cont..	6-3½x5½	134	33x5	†4250	4250	4375	5200	5500
Oldsmobile.....43-A	Own..	4-3 11/16x5½	115	32x4	††1145	1145	....	1645	1795
Oldsmobile.....37-A	Own..	6-2 11/16x4¾	112	32x4	††1450	1450	....	2145	2145
Oldsmobile.....46	Own..	8-2 7/16x4¾	122	33x4½	....	††1735	1735	....	2635
Oldsmobile.....47	Own..	8-2 7/16x4½	115	32x4	1595	‡1595	....	2145	2295
Overland.....4	Own..	4-3⅜x4	100	30x3½	595	595	....	850	895
Packard.....Single-Six	Own..	6-3⅝x4½	116	33x4½	2350	2350	....	3125	3350
Packard.....Twin Six	Own..	12-3 x5	136	35x5	4850	4850	4850	6600	6800
Paige.....6-44	Own..	6-3¼x5	119	32x4	1635	1635	....	2450	2570
Paige.....6-66	Cont..	6-3⅜x5	131	33x4½	‡2975	‡3295	2875	3755	3830
Pan American.....6-55	H-S...	6-3¼x5	121	33x4	2000	2000	2100	....	....
Paterson.....650	Cont..	6-3⅜x4½	120	32x4½	....	1595	1625	2695	2695
Peerless.....56-S-7	Own..	8-3⅜x5	125	34x4½	....	†2880	2880	3500	3790
Piedmont.....4-30	Lyc...	4-3½x5	116	32x3½	....	970	....	....	....
Piedmont.....6-40	Cont..	6-3⅜x4½	122	32x4	....	1285	....	....	....
Pierce-Arrow.....	Own..	6-4 x5½	138	33x5	7000	†6500	6500	8000	8500
Pilot.....6-45	Teetor	6-3½x5	120	32x4	1945	1895	....	....	....
Pilot.....65	Own..	6-3½x5	126	32x4½	2050	2000	2050	3000	2950
Porter.....46	Own..	4-4 x 6¾	142	35x5	6750	6750	6750	....	7800
Premier.....6-D	Own..	6-3⅜x5½	126¾	33x5	3790	†3690	3890	4690	5190
Premocar.....6-40 A	Falls..	6-3½x4½	117	32x4	1295	1295	....	1945	1995
R & V Knight.....R	Own..	4-3⅜x5	116	32x4	....	1850	....	2650	2750
R & V Knight.....J	Own..	6-3½x5½	127	32x4½	3350	†3350	3350	4000	4200
Reo Series....B.T & U	Own..	6-3 1/16x5	120	33x4	1650	....	1685	2700	2750
ReVere.....C	Dues..	4-4½x6	131	32x4½	4850	4650	†4650	....	6500
Roamer.....6-54-E	Cont..	6-3½x5¼	128	32x4½	2750	†2485	2750	†3950	3950
Roamer.....4-75-E	Dues..	4-4¼x6	128	32x4½	3850	3650	....	....	†4750
Rolls-Royce.....	Own..	6-4½x4¾	143½	33x5	U. S.	Chassis	Price	11750	....
Romer.....†.....R-22	Cont..	6-3¼x4½	120	33x4	1975	1975	2050	2400	2700
Saxon.....125	Own..	4-3½x5	112	32x4	1295	1295	....	1995	1995
Sayers Six.....DP	Cont..	6-3¼x4½	118	33x4	1745	1745	....	2995	2995
Seneca.....L & O	LeR..	4-3½x4½	108	30x3½	1045	1045	....	....	....
Southern Six.....660-2	H-S...	6-3¼x5	127	32x4½	2375	2375	2395	....	....
Sperling, A.....	Supr.	4-3⅜x5	114	32x4	980	980	....	1685	1685
Standard.....J	Own..	8-3¼x5	127	34x4½	3400	†3400	3400	4500	4800
Stanley Steamer.....	Own..	2-4 x5	130	34x4½	2800	2600	2600	3775	3850
Stanwood Six.....	Cont..	6-3¼x4½	118	33x4	1765	1765	....	2750	....
Stearns.....SKL4	Own..	4-3¼x5⅝	125	34x4½	2250	2250	2450	3150	3450
Stephens.....90	Own..	6-3¼x4½	122	33x4½	1800	†1850	*1850	2850	2850
Stevens-Duryea.....E	Own..	6-4 7/16x5½	138	35x5	7250	†6900	6800	....	†8900
Studebaker.....EJ-40	Own..	6-3½x4½	112	32x4	1125	1150	....	1550	1850
Studebaker.....EH-50	Own..	6-3½x5	119	32x4	1585	1635	†1635	2450	2550
Studebaker.....EG-60	Own..	6-3½x5	126	33x4½	....	....	1985	2850	2950
Stutz.....	Own..	4-4½x6	130	32x4½	3250	†3350	*3350	4800	....
Templar.....A-445	Own..	4-3⅜x5½	118	32x4	1985	1985	....	2785	2785
Texan.....A-38	Lyc...	4-3½x5	115	33x4	1195	1195	....	....	....
Texan.....C-12	H-S...	4-3½x5	115	33x4	1350	1350	....	....	....
Tulsa.....E-1-2-3	H-S...	4-3½x5	117	33x4	1175	1175	....	....	....
Tulsa.....F-1	H-S...	6-3¼x5	119	33x4	1585	1585	....	....	....
Velie.....48	Cont..	6-3¼x4½	115	32x4	1585	1585	†1800	2485	2485
Velie.....34	Falls..	6-3½x4½	112	32x3½	1235	1235	....	1750	2085
Vogue.....6-55	H-S...	6-3¼x5	124	32x4	....	1885	1960	2785	2885
Vogue.....6-66	Cont..	6-3½x5¼	124	33x4½	....	2085	2160	2885	2985
Waltham.....6	Own..	6-3½x5	120	32x4	2350	....	2350	3050	3150
Washington.....	Cont..	6-3¼x4½	116	32x4	....	1785	....	....	....
Washington Jr.....	Falls..	6-3½x4¼	116	32x4	....	1635	....	....	....
Westcott.....C-48	Cont..	6-3½x5¼	125	32x4½	....	2090	2090	....	3490
Westcott.....A-44	Cont..	6-3¼x4½	120	32x4	1890	1890	†1900	2890	2890
Wharton.....A	Curt..	8-4 x5	136	34x4½	....	†4885	†4885	....	....
Wills Sainte Claire..A-68	Own..	8-3½x4	121	32x4½	2875	2875	....	3750	4100
Willys-Knight.....20	Own..	4-3⅜x4½	118	33x4	1475	1525	....	2195	2395
Winther.....61	H-S...	6-3¼x5	120	32x4½	....	....	2250	....	....
Winton.....25	Own..	6-3¾x5½	132	35x5	4600	†4975	4600	5050	†5950

*—6-passenger. †—4-passenger. ‡—3-passenger. **—Price without starter and demountable rims. Price with starter and demountable rims $420. ††—Price without starter and demountable rims. Price with starter and demountable rims $450.

Engine Make: Anst.—Ansted. Cont—Continental. Curt—Curtiss. D.Ly—Dort Lycoming Dues.—Duesenberg. H-S—Herschell-Spillman. LeR—Leroy. Lyc—Lycoming. Nort.—Northway. Roch—Rochester. Rut—Rutenberg. Weid—Weidely. Wisc—Wisconsin. §Model 47—34 x 4½ Tires.

Specifications of Current Motor Truck Models

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive
Acason	¾	$1650§	3¾x5	34x5†	34x5†	W
Acason, R	1	2260	3¾x5¼	36x3½	36x5	W
Acason, RB	1½	2485	3¾x5¼	36x3½	36x6	W
Acason, H	2½	3295	4½x5¾	36x4*	36x8*	W
Acason, L	3½	4295	4½x5¾	36x5*	36x10*	W
Acason, M	5	5250	5 x6¼	36x6	40x12	W
Ace, C	1½	2295	3¾x5⅛	34x3½*	34x5*	W
Ace, A	2½	2795	4¼x5½	36x4*	36x7	W
Acme, G	¾	....	3¾x5	35x5†	35x5†	W
Acme, B	1	....	3¾x5	34x3½	34x5	W
Acme, F	1½	....	3¾x5	34x3½	34x5	W
Acme, A	2	....	4¼x5¼	36x4	36x7	W
Acme, AC	2½	....	4½x5½	36x4	36x7*	W
Acme, C	3½	....	4½x5½	36x5	40x10	W
Acme, E	5	....	4½x6	36x6	40x12	B
Akr'n Multi-Trk	1¼	1605	4 x5¼	34x5	34x5	W
American, 25	2½	3350	4 x6	33x4*	36x4d*	W
American, 40	4	4275	4½x6	36x5*	36x5d*	W
Apex, G	1	1150††	3½x5	33x5†	33x5†	I
Apex, D	1½	1915	3¾x5½	34x3½	34x4	I
Apex, E	2½	2695	4¼x5½	36x4	36x7	I
Apex, F	3½	3975	4½x6	36x5	36x10	I
Armleder, 20	1	....	3¾x5¼	34x3½*	34x5*	W
Armleder, HW	2½	....	4¼x5½	36x4*	36x7*	W
Armleder, KW	3½	....	4½x6	36x5	36x5d	W
Atco, B	1½	....	3¾x5¼	34x5†	36x6†	W
Atco, B1	1½	....	3¾x5¼	34x5†	36x6†	I
Atco, A	2½	....	4¼x5½	36x4†	36x8*	W
Atlas, M.D.	1	1185	3½x5	32x4½†	32x4½†	W
Atterbury, 20R	1½	2475	3¾x5	34x3½	34x5	W
Atterbury, 7CX	2½	3175	4½x5¼	36x4	36x4d	W
Atterbury, 7D	3½	3975	4½x5½	36x5	40x5d	W
Atterbury, 8E	5	4975	4¾x6	36x5	40x6d	W
Autocar, 21UF	1¼-2	1950	4¾x4½	34x4*	34x5*	D
Autocar, 21UG	1½-2	2050	4¾x4½	34x4*	34x5*	D
Autocar, 26Y	5	3350	4¼x5½	34x6	36x12	D
Autocar, 26-B	5	4100	4¼x5½	34x6	36x12	D
Available, H1½	1½	2475	4 x5½	36x3½*	36x5*	W
Available, H2	2	2775	4 x5½	36x3½*	36x6*	W
Available, H2½	2½	3175	4 x5½	36x4*	36x8*	W
Available, H3½	3½	4475	4½x5½	36x5	40x5d	W
Available, H5	5	5375	4¾x6	36x6	40x12	W
Available, H7	7	6000	5 x6	36x6	40x14	B
Avery	1	....	3 x4	34x5†	34x5†	I
Beck, A Jr.	1	1950	3¾x5	34x3½	34x4	I
Beck, C	2	2550	4½x5½	36x4	36x6	I
Bell, M	1	1495	3¾x5⅛	35x5	35x5†	W
Bell, E	1½	2100	3¾x5¼	34x3½	34x5†	W
Bell, O	2½	2550	4½x5½	34x4	34x6	D
Belmont, D	2	2675	3¾x5	34x3½*	34x6*	D
Belmont, F	3½	3525	4 x6	36x5*	36x5d*	D
Bessemer, G	1	1395	3½x5	35x5†	35x5†	I
Bessemer, H-2	1½	1995	3¾x5	36x3½	36x5	I
Bessemer, J-2	2½	2505	4½x5½	36x4	36x4d	I
Bessemer, K-2	4	3495	4½x5½	36x5	36x10	W
Bo semer, K-2	3½-4	5000	4½x6	36x6	36x6	W
Big 4, H	4	5500	4¾x6	36x6	36x6	W
Big 4, T	5	6000	5½x6	36x6	36x6	W
Big 4, K	7	6000	4½x6	36x6	36x10	W
Big 4, HA	7	6000	4½x6	36x6	36x10	W
Brinton, C	1½	1500	3¾x5	34x4	34x5	W
Brinton, F	2½	2250	4½x5½	36x4	36x7	B
Brockway, E	1	....	3¾x5⅛	35x5†	35x5†	W
Brockway, S-4	1½	....	3¾x5	36x3½*	36x5*	W
Brockway, K-5	2½	....	4½x5½	36x4	36x8	W
Brockway, R-4	3½	....	4½x5½	36x5	36x5d	W
Brockway, T-4	5	....	4¾x6	36x6	40x6d	W
Capitol, G1½	1½	2975	3¾x5	35x5	38x7	W
Capitol, H2½	2½	3700	4¼x6	36x4	36x8	W
Capitol, K2½	2½	4250	4¼x6	36x6	42x9	W
Capitol, M3½	3½	4425	4¼x6	36x5	36x10	W
Case, ††	2	3000	4¼x5¾	36x6	38x7	I
Champion Light Commercial	½	1195	3½x5	32x3½	32x3½	I
Chevrolet, G	¾	745	3¼x4	31x4†	31x4½†	B
Chevrolet, T	1	1125	3¾x5¼	33x4†	35x5†	W
Chicago, C1½	1½	....	3¾x5⅛	36x3½*	36x5*	W
Chicago, C2½	2½	....	4 x5⅛	36x4*	36x7*	W
Chicago, C3½	3½	....	4½x5½	36x5	36x10	W
Chicago, D5	5	....	4½x5½	36x6	40x12	W
Climber, A-20	1½	2450	3½x5	36x6*	38x7*	I
Clydesdale, 18	¾	1890	3¾x5	34x5	34x5	W
Clydesdale, 32C	1	2375	3¾x5½	34x3½*	34x5*	W
Clydesdale, 42C	1½	2475	4 x5⅛	36x3½	36x5	W
Clydesdale, 65C	2½	3250	4¼x5½	36x4	36x7	W
Clydesdale, 65EC	2½	3450	4½x5½	36x4	36x7	W
Clydesdale, 90C	3½	4100	4½x5½	36x5	40x10	W
Clydesdale, 120C	5	4500	4¾x6	36x6	40x12	W
Collier, 18	1	2350	3¾x5	34x4	34x5	W
Collier, 19	1½	2550	3¾x5	36x4	36x6	W
Collier, 21	2	2950	4¼x5¼	36x4	36x7	W
Collier, 22	2½	3250	4¼x5¼	36x4	36x4	W
Columbia, H	1½	2350	3¾x5	35x5†	34x5	I
Columbia, G	2½	2850	4 x5¼	36x4	36x7	I
Comet T	1½	1950	3¾x5	34x4	34x4	W
Commerce, T	¾-1¼	1450	3¾x5	34x4½†	34x4½†	B
Commerce, 12	1½	1800	3¾x5	35x5†	35x5†	I
Commerce, 16	2	2150	3¾x5	35x5†	35x5†	I
Commerce, 18	2½	2495	4½x5¼	36x6†	36x7†	W
Concord, A	2	3150	4 x5½	36x3½	36x6	W
Concord, B	3	3600	4¼x5½	36x4	36x8	W
Concord, AX	2	3250	4 x5½	36x3½	36x6	W
Concord, BX	3	3600	4½x5½	36x4	36x8	W
Cook, 41	2	3000	4 x5½	36x6†	38x7†	I
Corbitt, H-22	1	$1480	3¾x5	34x3½	34x4	W
Corbitt, E-22	1½	2200	3¾x5	34x3½	34x4	W
Corbitt, C-22	2	2600	4¼x5¼	36x3½	36x6	W
Corbitt, B-22	2½	3000	4½x5¼	36x4	36x7	W
Corbitt, R-22	3	3200	4½x5½	36x4	36x8	W
Corbitt, A-22	3½-4	3800	4½x5½	36x5	36x10	W
Corbitt, AA-22	5	4500	4¾x6	36x6	40x6d	W
Day-Elder, A	1	1600	3¾x5	34x3½	34x4	W
Day-Elder, B	1½	2000	3¾x5	34x3½	34x5	W
Day-Elder, D	2	2400	4½x5¼	36x4	36x7	W
Day-Elder, C	2½	2750	4½x5½	36x4	36x7	W
Day-Elder, F	3½	3150	4½x5½	36x5	36x5d	W
Day-Elder, E	5	4250	4½x6	36x5*	40x6d*	W
Dearborn, E	1	1700	3¾x5½	35x5†	35x5†	W
Dearborn, FX	1½	2300	3¾x5½	34x4	34x5	W
Dearborn, F	1½	2180	3¾x5⅛	34x4*	34x5*	W
Dearborn, 48	2	2590	3¾x5⅛	35x5†	34x7†	W
Defiance, G	1	1695§	3¾x5	35x5†	35x5†	I
Defiance, D	1½	2095§	3¾x5	35x5†	36x6†	I
Defiance, E	2	2275§	3¾x5	35x5†	38x7†	I
DeMartini, 1½	1½	2600	3¾x5	34x3½	34x6	W
DeMartini, 2	2	3300	4 x5½	36x3½	36x7	W
DeMartini 3	3	4250	4¼x5½	36x4	36x10	W
DeMartini 4	4	4800	4½x6	36x5	36x12	W
Denby, 31	¾	1625	3½x5	35x5	35x5	B
Denby, 33	1½	2300	3¾x5	35x5†	38x7†	I
Denby, 34	2	2600	3¾x5	36x3½	36x6	I
Denby, 25	3	3300	4½x5¼	36x4	36x7	I
Denby, 27	4	4200	4½x5½	36x5	36x5d	I
Denby, 210	5	4850	4½x5½	36x6	40x6d	I
Dependable, A	¾-1	1650	3¾x5⅛	34x5	36x6	W
Dependable, C	1½	2350	3¾x5¼	34x3½	34x5	W
Dependable, D	2	2650	4 x5½	34x5	36x6	W
Dependable, E	2½	2950	4¼x5½	36x4	36x7	W
Dependable, G	3½	3550	4½x6	36x6	38x7	W
Diamond T, O	1-1¼	1975	3¾x5¼	36x3½†	36x4†	W
Diamond T, FS	1½	2525	3¾x5¼	36x3½	36x5	W
Diamond T, T	1½	2250	3¾x5¼	36x3½	36x5	W
Diamond T, U	2	2650	4 x5¼	36x4	36x7	W
Diamond T, K	3½	3750	4¼x5½	36x5	36x5d	W
Diamond T, EL	5	4325	4½x5½	36x6	40x6d	W
Diamond T, S	5	4500	4¾x6	36x6	40x6d	W
Diehl, A	1	....	3½x5	34x4½	35x5	I
Diehl, B	1½	....	3½x5	36x6	36x6	I
Dispatch, F	1	1350	3¾x5	34x4†	34x4†	I
Doane	2½	4100††	4¼x5¾	36x5	36x7	C
Doane	3½	5100††	4½x5¾	36x5	36x5d	C
Doane	6	6000††	5 x6½	36x6	40x6d	C
Dodge Brothers	½	885	3¾x4½	32x4†	32x4†	B
Dorris, K-4	2-2½	3400	4¼x5½	36x4	36x7	W
Dorris, K-7	3½	4400	4¼x5½	36x5	36x10	W
Dort, 103	½	685	3½x5	31x4	31x4	B
Double Drive B	3	4000	4¼x5½	6	6	W
Douglas G	1½	1850	3¾x5⅛	36x5	37x8*	W
Douglas I	3	2950	4¼x5½	36x6	37x8*	W
Duplex, A	1½	2775	4 x5¼	35x5†	38x7†	I
Duplex, E	3½	4250	4½x5½	36x8	36x8	I
Duty, 21	2	1490	3½x5	34x3½	34x5	I
Eagle, 100-2	2	2275	3¾x5¼	34x4*	34x7*	I
Erie, E	1½	....	3¾x5¼	36x6†	36x6†	W
Erie, A	2½	....	4¼x5½	36x4	36x4d	W
F.W.D., B	3	4200	4¾x5½	36x6	36x6	B
Facts, 1921	2½	2295§	4¼x5½	36x4*	36x8*	W
Fageol, 1½	1½	3000	3¾x5¼	34x3½*	34x6*	W
Fageol, 2½	2½	3900	4¼x5¾	34x4	36x7	W
Fageol, 3½	3½	5000	4½x6¼	36x5*	40x5d*	W
Fageol, 5	5	5700	4½x6¼	36x6	40x6d	W
Fargo, R	2	1900	3¾x5	36x4	36x6	I
Federal, SD	1½	1800	3¾x5	35x5†	36x6†	W
Federal, TE	1½	2175	4½x5¼	36x3½	36x5	W
Federal, UE	2	2425	4½x5¼	36x4	36x7	W
Federal, WE	3½	3150	4½x5½	36x5	36x5d	W
Federal, X2	5-6	4550	4¾x6	36x6	40x6d	W
Ford, TT	1	445	3¾x4	30x3½*	32x4½*	W
Forschler, A	1	....	3½x5	34x3	34x4	W
Forschler, AX	1½	....	3½x5	36x3½	36x5	W
Forschler, B	2	....	4½x5¼	36x4	36x7	W
Forschler, BX	3	....	4½x5¼	36x4	36x8	W
Front Drive C	1½	2800	3¾x5½	5	4	W
G & J** 20	1	2450	3½x5⅛	34x5†	34x5†	W
G & J** A	2	3850	4x5¼	36x4	36x7	W
G & J** B	3½	5175	4½x5½	36x5	36x5d	B
G.M.C., K16	1	1495	3½x5½	34x5†	34x5†	B
G.M.C., K41 A	2	3000	4 x5½	36x4*	36x7*	W
G.M.C., K71 A	3½	4250	4½x6	36x5	40x5d	W
G.M.C., K101A —	5	4650	4½x6	36x5	40x6d	W
G.W.W.	1½	1950	3¾x5½	35x5	35x5	I
Garford, 15	¾	1500	3¾x5¼	34x5†	34x5†	W
Garford, 25	1¼	1990	3¾x5¼	36x3½	36x4	W
Garford, 70-H	2	2750	4¼x5½	36x4	36x7	W
Garford, 77D	3½	$4300	4½x6	36x5	36x6d	W
Garford, 68D	5	5200	5 x6½	36x6	40x6d	W
Garford, 150-A	7½	5500	5x6½	36x6	40x7d	C
Gary, F	1	2100	3¾x5	36x3½	36x4	W
Gary, I	1½	2550	4 x5¼	36x3½	36x5	W
Gary, J	2½	3150	4¼x5½	36x4	36x7	W
Gary, K	3½	4050	4½x6	36x5	40x5d	W
Gary, M	5	5150	5 x6½	36x6	40x6d	W
Gersix, M	1½	3100	4 x5½	36x3½	36x7	W
Gersix, K	2½	3500	4½x5½	36x4	36x8	W
Gersix	3½	4500	4½x6	36x5	40x12	W
Golden West, GH	3	4500	4½x6	36x7	36x7	W
Golden West, G	3½	5000	4½x5½	36x6	36x6	W
Graham Bros. 1-Ton	1	1370	3½x4½	32x4½	34x5	B
Graham Bros. A	1½	1420	3½x4½	33x4½†	36x6†	B
Gramm-Bern., 10	1	1365§	3½x5½	34x4	34x5	F
Gramm-Bern., 15	1½	2050§	3¾x5	33x5†	33x5†	F
Gramm-Bern., 65	1½	2725§	3¾x5	36x3½*	36x5*	J
Gramm-Bern., 20	2	3175§	4½x5¼	36x4*	36x7*	W
Gramm-Bern., 25	2½	3575§	4¼x5½	36x4*	36x4d*	W
Gramm-Bern., 35	3½	4375§	4½x5½	36x5	40x5d*	W
Gramm-Bern., 50	5	5275§	4¾x6	36x6	40x6d*	W
Hahn, J4	1	....	3¾x5	34x5*	34x5*	W
Hahn, CD	1½	....	4½x5¼	36x3½*	36x6*	W
Hahn, EE	2½	....	4½x5½	36x4*	36x8*	W
Hahn, F	3½	....	4½x5½	36x5*	36x10*	W
Hahn, EF	5	....	4¾x6	36x6	40x12	W
Hal-Fur, E	1½	2350	4 x5¼	34x5†	38x7†	W
Hal-Fur, B	2½	3000	4¼x5½	35x5*	38x7*	W
Hal-Fur, F	3½	4000	4½x5½	36x6†	40x10†	W
Hall, 1½	1½	3100	3¾x5	34x5†	38x7†	W
Hall, 2½	2½	3275	4¼x5¼	36x4	36x6	W
Hall, 3½	3½	4100	4½x5½	36x5	36x5d	W
Hall, 5	5	5100	4½x5½	36x5	40x6d	W
Hall, 7 chain	7	5100	4½x5½	36x5	40x6d	C
Harvey, WEA	1½	2550	4¼x5½	34x3½	34x5	W
Harvey, WOA	2	2950	4¼x5½	34x4	34x7	W
Harvey, WFA	2½	3300	4¼x5½	36x4	36x7	W
Harvey, WHA	3½	3950	4½x6	36x5	36x5d	W
Harvey, WKA	5	4500	4½x6	36x6	40x6d	W
Hawkeye, K	1½	1850	3¾x5¼	34x3½*	34x5*	I
Hawkeye, M	2	2650	4¼x5½	36x4*	36x6*	I
Hawkeye, N	3	3700	4½x6	36x5*	36x10*	I
Hendrickson, N	2½	3150	4¼x5¾	36x4*	36x7*	W
Hendrickson, M	3½	3975	4¼x5¾	36x5*	36x5d*	W
Huffman, B	1½	1995	3¾x5	34x3½	34x6	I
Huffman, C	1½	1795	3¾x5¼	34x3½	34x6d	W
Hurlburt A	1½	2850	4 x5½	34x4	34x5	W
Hurlburt B	2½	3750	4¼x5½	36x4	36x4d	W
Hurlburt C	3½	4590	4½x6	36x5	36x5d	W
Hurlburt D	5	5500	4½x6	36x5	40x6d	W
Indep'd't(Iowa), B	1	1665	3½x5	34x3½	34x4	W
Indep'd't(Iowa), C	1½	2040	3¾x5¼	34x3½	34x5	I
Indep'd't(Ia.), H.I	2½	2940	4½x5¼	34x4	34x6	I
Indep d't (Ohio), F	1½	2385	3¾x5	36x3½	36x5	W
Indep'd't(Ohio), H	2½	3085	4½x5¼	36x4	36x4d	W
Indep'd't(Ohio), K	3½	3985	4½x5½	36x5	36x5d	W
Indiana, 12	1½	....	3¾x5½	34x3½*	34x5*	W
Indiana, 20	2	....	4½x5½	36x4*	36x7*	W
Indiana, 25	2½	....	4½x5½	36x4*	36x8*	W
Indiana, 35	3½	....	4½x5½	36x5*	36x5d*	W
Indiana, 51	5	....	5 x6¼	36x5*	40x6d*	W
Inland, D	2	2950	4 x5	34x5	34x6	I
International, S	¾	1500	3½x5	34x5†	34x5†	I
International, 21	1	1750	3½x5¼	36x3½	36x3½	I
International, 31	1½	1850	3½x5¼	36x3½	36x4	I
International, 41	2	2100	3½x5¼	36x3½	36x5	I
International, 61	3	2400	4½x5	36x4	36x6	I
International, 101	5	3600	4½x5	36x5	40x10	I
J & J, D	2	3250	4 x5	34x4*	34x6	I
Jackson, 4WD	3½	3850	4½x5½	36x7	36x7	B
Jumbo, 15	1½	2425	3¾x5¼	36x3½	36x5	I
Jumbo, 20	2	2675	3¾x5¼	35x5†	38x7†	I
Jumbo, 25	2½	3090	4½x5½	36x4	36x7	I
Jumbo, 30	3	3590	4¼x5½	36x6†	42x9†	I
Jumbo, 35	3½	4080	4½x6	36x5	36x10†	I
Jumbo, 40	4	4730	4½x6	38x7†	44x10	I
K-Z, 1	1	1750	3½x5	34x3½	34x5	W
K-Z, 1½	1½	2075	3¾x5	36x4	36x6	W
K-Z, 2½	2½	2559	4½x5¼	36x4	36x8	W
K-Z, 3½	3½	3350	4½x5½	36x5	40x10	W
K-Z, 5	5	3850	4½x5½	36x6	40x6d	W
Kalamazoo, G-1	1½	2495	3¾x5	34x4	34x5	W
Kalamazoo, G-2	1½	2800§	3¾x5	36x5	36x6	W
Kalamazoo, H	2½	3275§	4 x6	36x4	36x8	W
Kalamazoo, K	3½	4000§	4¼x6	36x5	36x10	W
Kalamazoo K-5	5	4500§	4½x6	36x6	36x6d	W
Karavan, A	2½	3900	4¼x6	36x4	36x8	W
Kearns, H	1	1600	3½x4½	32x4½†	32x4½†	I
Kearns, N	2	2200	3½x5	34x3½	34x6	I
Kearns, N	3	2900	3¾x5¼	36x3½	36x6	C
[1]Kelly-S., K-31	1½	2900	3¾x5¼	36x3½	36x6	W
[1]Kelly-S., K-34	1½	2900	3¾x5¼	36x3½	36x6	W
[1]Kelly-S., K-38	2½	3250	3¾x5¼	36x4	36x4d	C
[1]Kelly-S., K-35	2½	3250	3¾x5¼	36x4	36x4d	C
[1]Kelly-S., K-40	3½	4200	4½x6½	36x5	40x5d	I
[1]Kelly-S., K-41	3½	4200	4½x6½	36x5	40x5d	W
[1]Kelly-S., K-42	3½	4200	4½x6½	36x5	40x5d	W

*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl. Trac., Tractor. **Canadian made.

Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear. *Tires—optional. †Pneumatic Tires. All others solid. ††Price includes body. §—Price includes several items of equipment.

1—Kelly-Springfield.

Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive
[1]Kelly-S., K-45	4	$4550	4½x6½	36x5	40x6d	C
[1]Kelly-S., K-50	5	4900	4½x6½	36x6	40x6d	C
[1]Kelly-S., K-60	6	5100	4½x6½	36x6	40x7d	C
Keystone, 40	2	2450	3¾x5½	34x5†	38x7†	I
Kimball, AB	2	3675	4 x6	36x4	36x7	W
Kimball, AC	2½	3975	4½x6	36x4	36x8	W
Kimball, AK	3	4500	4½x6	36x4	36x10	W
Kimball, AE	4	5000	4¾x6	36x5	40x12	W
Kimball, AF	5	5800	5 x6	36x6	40x7d	W
Kissel, Express	1½	1985††	3½x5½	34x5†	34x5†	W
Kissel, Utility	1½	1975	3½x5½	36x3½	36x5	W
Kissel, Freighter	2½	2875	4¼x5½	36x4	36x7	W
Kissel, H. D.	4	3675	4¼x5½	36x5	36x5d	W
Kleiber, AA	1	2600	4½x5¼	34x3½*	34x5*	W
Kleiber, A	1½	3100	4½x5¼	36x3½*	36x6*	W
Kleiber, BB	2	3600	4½x5½	36x4*	36x7*	W
Kleiber, B	2½	3950	4½x5½	36x5*	36x8	W
Kleiber, C	3½	4600	4½x5½	36x5	36x5d	W
Kleiber, D	5	5300	5 x6½	36x6	40x12	W
Koehler, D	1½	1995	3½x5	34x3½	34x5	W
Koehler, M	2½	3175	4 x5¼	36x4	36x7	W
Koehler, MCS	2½	3275	4 x5¼	36x4	36x7	W
Koehler, F	3½	4150	4½x5½	36x5	36x10	W
Koehler,MT, Trac	5	3275	4 x5¼	36x4	36x7	W
Lange, B	2½	3350	4¼x5¼	36x4*	36x7*	C
Larrabee, X-Z	1	1925	3¼x4½	34x5†	34x5†	B
Larrabee, U	1½	2400	3¾x5	34x3½	34x5	W
Larrabee, K	2½	3200	4¼x5¼	36x4	36x7	W
Larrabee, L-4	3½	4000	4½x5½	36x5	36x5‡	W
Larrabee, W	5	4800	4½x6	36x6	40x8d	W
Luedinghaus, C	1	1695	3½x5	35x5†	35x5†	W
Luedinghaus, W	1½	2490	3¾x5¼	34x3½*	34x5*	W
Luedinghaus, K	2-2½	3150	4¼x5¾	36x4*	36x7*	W
Maccar, L	1½	2700	4¼x5¼	36x4	36x6	W
Maccar, H-A	2	3100	4¼x5¼	36x4	36x4d	W
Maccar, H-2	3	3400	4¼x5¼	36x4	36x4d	W
Maccar, M-2	4	4200	4½x6	36x5	36x5d	W
Maccar, G	5-6	4950	4¾x6	36x5	40x6d	W
MacDonald, A	7½	5750	4½x6	40x7	40x14	I
Mack, AB D.R.	1½	3450	4 x5	36x4	36x3½d	D
Mack, AB	2½	3400	4 x5	36x4	36x4d	C
Mack, AB Chain	1½	3000	4 x5	36x4	36x3½d	D
Mack, AB Chain	2	3300	4 x5	36x4	36x4d	C
Mack, AB D.R.	2	3750	4 x5	36x4	36x4d	D
Mack, AC Chain	3½	4950	5 x6	36x5	40x5d	C
Mack, AC Chain	5	5500	5 x6	36x6	40x6d	C
Mack, AC Chain	6½	5750	5 x6	36x6	40x12	C
Mack, AC Chain	7½	6000	5 x6	36x7	40x7d	C
Mack Trac, AB	5	3400	4 x5	36x4	36x4d	C
Mack Trac., AC	7	4950	5 x6	36x5	40x5d	C
Mack Trac. AC	10	5500	5 x6	36x6	40x6d	C
Mack Trac., AC	13	5750	5 x6	36x6	40x12	C
Mack Trac., AC	15	6000	5 x6	36x7	40x7d	C
Mapleleaf, AA**	2	4150	4 x5¼	36x4	36x7	W
Mapleleaf, BB**	3	4775	4¼x5½	36x4	36x4d	W
Mapleleaf, CC**	4	5770	4½x5½	36x5	36x5d	W
Mapleleaf, DD**	5	6490	4½x5½	36x6	40x6d	W
Master, JW	1½	2690	4½x5½	34x3½	34x5	W
Master, W	2½	3290	4¼x5½	34x4	36x7	W
Master, D	2½	3540	4¼x5½	34x4	36x7	D
Master, A	3½	4190	4½x6	36x5	40x5d	W
Master, E	3½	4610	4½x6	36x5	40x5d	D
Master, B	5	5290	4¾x6½	36x6	40x6d	W
Master, F	5	5440	4¾x6½	36x6	40x6d	D
Master Trac., T	6	3740	4¼x5½	34x4	36x7	D
Maxwell, 1½	1½	1332	3⅝x4¼	32x3	32x4	W
Menominee, HT	1	2080	3¾x5	34x3½	36x5	W
Menominee, H	1½	2725	4 x5	36x3½	36x5	W
Menominee, D	2	3245	4 x6	36x4	36x8	W
Menominee, G	3½	4270	4½x6	36x5	36x10	W
Menominee, J-3	5	5450	4¾x6	36x6	40x12	W
Moline, 10	1½	1985	3½x5	34x5†	36x6†	I
Moreland, 21B	1½	2800	4½x5¼	36x3½	36x6	W
Moreland, 21C	2½	3500	4½x5½	36x4	36x8	W
Moreland, 21H	3½	4800	4¾x6	36x5	40x5d	W
Moreland, 21J	5	5000	4¾x6	36x6	40x6d	W
Napoleon, 7	¾	1350	3½x5	38x4	33x4†	I
Napoleon, 9	1	1535	3½x5	35x5*	35x5*	I
Napoleon, 11	1½	1860	3½x5	35x5*	36x6*	I
Nash, 2018	1	1895	3¾x5¼	35x5	36x6	I
Nash, 3018	2	2550	3¾x5¼	36x6	40x8	I
Nash, Quad.	2	3250	4¼x5½	40x8	40x8	I
Nash, 5018	2½	2550	3¾x5¼	34x4	34x6	I
[2]Nelson, F1½	1½	....	4½x5¼	36x3½	36x5	W
[2]Nelson, F2	2	....	4½x5¼	36x4	36x7	W
[2]Nelson, F3½	3½	....	4½x5½	36x5	36x5d	W
[2]Nelson, FC5	5	....	4¾x6	36x6	40x6d	W
Netco, D	3	3100	4½x5¼	36x4*	36x7*	W
Netco, H	2½	3500	4½x5½	36x4*	36x8*	W
New York, M	1½	....	4½x5¼	36x3½	36x5	W
New York, N	2-2½	....	4½x5¼	36x4	36x4d	W
Niles, E	2	3000	4½x5¼	36x4*	36x7*	W
Noble, B30	1½	2100	3¾x5¼	36x3½	36x5	W
Noble, C40	2	2675	4 x5½	36x4	36x7	W
Noble, D50	2½	2950	4¼x5½	36x4	36x8	W
Noble, E70	3½	3800	4½x6	36x5	36x10	W
Northway, B-2	2	3400	4 x6	36x4	36x4d	W
Northway, B-3	3½	4400	4 x6	36x5	40x5d	W
NorthwesternW	1½	2700	4¼x5¼	34x4	36x6	W
Northwestern WS	2½	3500	4½x5½	36x4	36x8	W
Norwalk, 25E	1	1695	3½x5	34x3½	34x4	W
Norwalk, 35E	1½	2025	3½x5	34x3½	34x3½d	W
Norwalk,35E.Spec	1½	2285	3¾x5¼	34x3½	34x5	W
O. K., K1	1½	$2675	4 x5½	36x3½	36x5	W
O. K., L1	2½	3450	4¼x5½	36x4	36x8	W
O. K., M1	3½	4250	4½x6	36x5	36x5d	W
Ogden, A1	1½	2375	3¾x5	36x3½	36x5	W
Ogden, E	2½	2975	4½x5¼	36x4	36x7	W
Old Hickory, W	1	2175	3¾x5	36x3½*	36x4*	W
Old Reliable, A	1½	2350	4 x5	34x4	36x6	W
Old Reliable, B	2½	3500	4¼x6	34x4	36x4d	W
Old Reliable, C	3½	4250	4¼x6	36x5	36x5d	W
Old Reliable, D	5	5250	4¾x6	36x6	40x6d	W
OldReliable,KLM	7	6000	4¾x6¼	36x6	40x7d	C
Oldsmobile Econ.	1	1095	3½x5¼	35x5†	35x5†	I
Olympic, A	2½	3500	4¼x5½	36x4	36x7	W
Oshkosh, A	2	3750	3½x5	36x6†	36x6†	4
Oshkosh, AA	2	3850	3½x6	36x6†	36x6†	4
Oshkosh, B	2½	4150	4 x5½	38x7†	38x7†	4
Oshkosh, BB	2½	4300	4 x5½	38x7†	38x7†	4
Packard, EC	1½-3	3500	4¼x5½	36x4	36x7	W
Packard, EX	1½-3	4000	4¼x5½	36x6†	40x8†	W
Packard, ED	2-4½	4100	4½x5½	36x5	36x5d	W
Packard, EF	4-7½	4500	5 x5½	36x6	40x6d	W
Paige, 52-19	1½	2880	4 x5¼	34x3½	34x5	W
Paige, 54-20	2½	3400	4¼x5½	34x4	34x8	W
Paige, 51-18	3½	4285	4½x5½	36x5	36x5d	W
Parker, F20	2	3500	4 x6	34x4	36x4d	W
Parker, J20	3½	4400	4½x6	36x5	40x5d	W
Parker, M20	5	5500	4¾x6	36x6	40x6d	W
Patriot, Revere	1	1500	3¾x5	35x5†	35x5†	W
Patriot, Lincoln	2	2050	4 5½	34x3½	34x5	W
Patriot, Washgt'n	3	2900	4½x5½	36x4	36x7	W
Piedmont, 4-30	1	1200	3½x5	34x4†	34x4†	W
Pierce-Arrow	2	3200	4 x5½	36x4	36x4d	W
Pierce-Arrow	3½	4350	4½x6¾	36x5	36x5d	W
Pierce-Arrow	5	4850	4½x6¾	36x5	40x6d	W
Pioneer, 59	1	1550	3¾x4¼	32x4½†	32x4½†	W
Pittsburger, C-21	3	3800	4½x5¼	36x5*	36x7*	W
Power, F	2	3400	3¾x5¼	36x6	36x6	W
Power, C	3½	4500	4¼x5½	36x5	40x10	W
Premocar, B-143	1½	2475	3½x5	36x6†	36x6†	W
Rainier, R-21	¾	1990	3½x5	35x5†	35x5†	W
Rainier, R-19	1	2150	3½x5	34x3½	31x4	W
Rainier, R-16	1½	2490	3¾x5	34x3½	34x5	W
Rainier, R-18	2	2890	4¼x5¼	34x4	34x6	W
Rainier, R-20	2½	3550	4½x5¼	34x4	34x7	W
Rainier, R-15	3½	4400	4½x5½	36x5	36x5d	W
Rainier, R-17	5	5100	4½x6	36x6	36x6d	W
Ranger, TK-22-2	2	2775	3¾x5	36x6†	38x7†	W
Reo, F	¾-1‡	1245	4½x4½	34x4½†	34x4½†	B
Reliance, 10A	1½	2400	4 x5½	36x3½	36x5	I
Reliance, 20B	2½	3100	4¼x5½	36x4	36x4d	I
Republic, 75	¾	1395††	3½x5	32x4½	32x4½	I
Republic, 10	1	1395	3¾x5	35x5†	35x5†	I
Republic,10Exp.	1	1695	3¾x5	35x5†	35x5†	I
Republic, 11X	1½	1795	3¾x5	34x3½	34x5	I
Republic, 19	2½	2155	4½x5¼	36x4	36x7	I
Republic, 20	3½	3095	4½x5½	36x5	36x10	I
Rowe, CW	1½	3000	3¾x5	36x6†	36x6†	W
Rowe, C. D. W.	2	3300	4 x5	34x4	36x3½d	W
Rowe, G. S. W.	3	4150	4 x6	34x5	36x5d	W
Rowe, G. P. W.	3	5250	3¼x5‡	38x7†	42x9†	W
Rowe, HW	4	4500	4¼x6	36x5	36x6d	W
Rowe. F. W.	5	5500	4½x6	36x6	40x6d	W
Sandow, G	1	2295	3¾x5	34x3½	34x5	W
Sandow, CG	1½	2590	3¾x5	34x4	34x6	W
Sandow, J	2½	3275	4½x5¼	36x4	36x7	W
Sandow, M	3½	4295	4½x5½	36x5	36x5d	W
Sandow, L	5	4975	4½x5½	36x6	40x6d	W
Sanford, 25	2½	3350	4½x5¼	36x4	36x4d	W
Sanford, 35	3½	4200	4½x5½	36x5	36x5d	W
Sanford, 50	5	5100	4¾x6	36x5	40x6d	W
Schacht, 2-Ton	2	3200	4¼x5½	36x4	36x7	W
Schacht, 3-Ton	3	3800	4¼x5½	36x5	36x5d	W
Schacht, 4-Ton	4	4200	4¼x6	36x5	36x5d	W
Schacht, 5-Ton	5	4400	4½x6	36x5	40x5d	W
Schacht, 7-Ton	7	5000	4½x6	36x6	40x7d	W
Schwartz, A	1	1695	3½x5	33x4½†	33x4½†	B
Schwartz, BW	1½	2600	3¾x5¼	34x3½*	34x7*	W
Schwartz, C.W.S.	2½	3200	4¼x5½	36x4	36x8	W
Schwartz, DW	5	4900	4½x6	36x6	40x12	W
Selden, 1½A	1½	2360	3¾x5	34x3½	34x5	W
Selden, 2½A	2½	3425	4½x5¼	36x4	36x7	W
Selden, 3½A	3½	4175	4½x5½	36x5	36x10	W
Selden, 5A	5	5600	4¾x6	36x6	40x12	W
Seneca, M	½	1020	3½x4½	30x3½†	30x3½†	B
Service, 15	1¼	1840	3½x5	34x4½	35x5	B
Service, 220	1½	2415	3½x5½	34x3½	34x5	W
Service, 31	2	2985	4 x5½	36x3½	36x6	W
Service, 36	2	3415	4¼x5½	35x5†	38x7†	W
Service, 51	2½	3475	4¼x5½	36x4	36x7	W
Service, 71	3½	4285	4¼x5½	36x5	36x5d	W
Service, 76	3½	4485	4½x6	36x5	36x5d	W
Service, 101	5	5275	4½x6	36x6	40x6d	W
Signal, NF	1	1950	3¾x5	34x5†	36x6†	W
Signal, H	1½	2450	4¼x5¼	34x4	36x6	W
Signal, J	2½	2875	4½x5¼	34x4	36x8	W
Signal, M	3½	3675	4½x5½	36x5	40x5d	W
Signal, R	5	$4400	4¾x6	36x6	40x6d	W
Southern, 10	1	2090	3¾x5	34x3½	34x4	W
Southern, 15	1½	2580	3¾x5½	36x6†	34x4	W
Southern, 20	2	2990	4¾x5¼	36x6†	40x8*	W
Standard, 1-K	1-1½	1600	3¾x5	34x3½*	34x5*	W
Standard, 76	2½-3	2400	4½x5¼	36x4*	36x7*	W
Standard, 66	3½-4	3150	4½x5½	36x5	36x10	W
Standard, 5-K	5-7	4400	4¾x6	36x6	40x12	W
Sterling, 1½	1½	2885	4 x5¾	36x3½	36x5*	W
Sterling, 2	2	3085	4 x5¾	36x4	36x6	W
Sterling, 2½	2½	3290	4¾x5¾	36x4*	36x4d*	W
Sterling, 3½	3½	4325	4½x6¼	36x5*	40x5d*	W
Sterling, 5-W	5	4950	5 x6¼	36x6*	40x6d*	W
Sterling, 5-C	5	5500	5 x6¼	36x6	40x6d	C
Sterling, 7½	7½	6000	5 x6¼	36x6	40x7d	C
Stewart, 14	¾	1395	3½x5½	32x4½†	32x4½†	I
Stewart, 15	1	1875	3½x5½	35x5†	35x5†	I
Stewart, 9	1½	2200	3¾x5	34x3½	34x5	I
Stewart, 7	2	2800	4¼x5¼	34x4	34x7	I
Stewart, 7-X	2½	2950	4¼x5½	34x4	34x7	I
Stewart, 10	3½	3850	4½x5½	36x5	36x5d	I
Stewart, 10-X	3½	3850	4½x6	36x5	36x5d	I
Stoughton, C	¾	1240	3½x5	34x4½†	34x4½†	W
Stoughton, A	1	1995	3¾x5¼	34x4½†	35x5†	W
Stoughton, B	1½	2350	3¾x5¼	36x3½	36x5	W
Stoughton, D	2	2800	4 x5¼	36x4	36x7	W
Stoughton, F	3	3600	4¼x5½	36x5d	36x5d	W
Sullivan, E	2	3350	4¼x5½	36x4*	36x7*	W
Sullivan, H	3½	4650	4½x6	36x5	36x5d	W
Superior, D	1	1650	3¾x5	34x4½†	34x4	I
Superior, E	2	2600	4¼x5¼	36x4	36x6	I
Super Truck, 50	2½	3300	4 x6	36x4	36x8	W
Super Truck, 70	3½	4300	4¼x6	36x5	40x5d	W
Super Truck, 100	5	5300	4¾x6	36x5	40x12	W
Super Truck, 150	7½	6300	5 x6	36x6	40x7d	W
Texan, A38	¾	1095	3½x5	33x4	33x4	I
Texan, TK39	1½	1550	3½x5	36x6	38x7	W
Tidlin, GW	1½	2400	4¼x5¼	36x3½	36x5	W
Tidlin, MW	2½	3100	4½x5¼	36x4	36x3½d	W
Tidlin, PW	3½	4100	4½x5½	36x5	40x5d	W
Tidlin, F50	5	4800	4¾x6	36x6	40x6d	W
Tidlin, F60	6	5000	4¾x6	36x6	40x12	W
Titan	3½	4100	4¼x5½	36x5	36x10	I
Titan	5	4750	4½x6	36x5	40x6d	I
Titan	2	2850	4x5	34x4*	36x7	I
Titan, 6-Ton	6	5150	4½x6	36x5	40x12	I
Tower, J	1½	2900	4½x5¼	35x5	38x7	W
Tower, H	2½	3200	4½x5¼	36x4	36x7	W
Tower, G	3½	4100	4½x5½	36x5	36x5d	W
Traffic, C	....	1595	3¾x5	34x3½	34x5*	I
Traffic	3	1895	3¾x5	36x4	36x7	I
Transport, 20	1	1395	3¾x5½	34x3½	34x4	I
Transport, 30	1½	1995	3¾x5	36x3½	36x5	I
Transport, 50	2½	2785	4¼x5½	36x4	36x7	I
Transport, 70	3½	3885	4½x6	36x5	36x10	I
Traylor, B	1½	2390	3¾x5½	34x3½	34x5	W
Traylor, C	2	2850	4 x5½	36x4	36x7	W
Traylor, D	3	3300	4¼x5½	36x4	36x8*	W
Traylor, E	4	4450	4½x6	35x5	40x10	W
Traylor, F	5	4700	4½x6	36x6	40x6d	W
Triangle, AA	¾-1	1385	3¼x5	34x4½†	34x4½†	I
Triangle, A	1½	2350	3¾x5¼	34x3½*	34x6*	I
Triangle, C	2	2700	3¾x5¼	36x4*	36x6*	I
Triangle, B	2½	2950	4 x5¾	36x4*	36x7*	I
Triumph, G	1	1995	3½x5½	34x5†	34x5†	W
Triumph, HC	1½	2550	3¾x5¼	36x3½	36x5	W
Triumph, HB	2	2900	3¾x5¼	36x4	36x7	W
Twin City, B.W.	2	2750	4 x5½	36x4	36x7	I
Twin City, A.W.	3½	4000	4¼x6	36x5	40x5d	W
[3]Twin City, B	3½	....	5⅛x6	36x6	36x6	I
[3]Twin City, A	5	....	5⅛x6	36x7	36x7	I
Ultimate, A	2	3200	4 x5½	36x3½*	36x6*	W
Ultimate, AJ	2	3250	4¼x5½	35x5†	38x7†	W
Ultimate, AJL	2	3300	4½x5½	36x3½	36x6	W
Ultimate, B	3	3750	4¼x5½	36x4*	36x4d*	W
Ultimate, BL	3	3850	4¼x5½	36x4*	36x4d*	W
Union, FW	2½	3490	4 x6	36x5*	36x8*	D
Union, HW	4	4485	4½x6	36x6	40x12	D
Union, JW	6	5800	5 x6	36x6	40x14	D
United, A	1½	2445	3¾x5¼	36x3½*	34x5*	I
United, B	2½	3150	4¼x5½	36x4*	36x7*	I
United, C	3½	3975	4¼x5½	36x5	36x5d	I
United, V	5	5000	4½x6	36x6	40x6d	I
United States, N	1½	1975	3¾x5	36x3½*	36x5*	I
United States, R	3	3075	4 x5¼	36x4	36x4d	W
United States, S	4	3875	4½x5½	36x5	36x5d	W
United States, T	6	4850	4¾x6½	36x6	40x6d	W
Velie, 46	1½	1585	3¾x5	36x3½	36x5	I
Veteran, E**	1-1½	3500	3¾x5¼	35x5†	36x6†	W
Veteran, A**	2-2½	4000	4¼x5½	36x4*	36x7*	W
Veteran, D**	2½-3	4400	4¼x5½	36x4*	36x7*	W
Veteran, H**	3½-4	5600	4¼x6	36x5	36x5d	W
Vim, 29	½	1050	3½x4½	31x4†	31x4†	W
Vim, 30	½	1175	3½x4½	32x4½	32x4½	W
Vim, 31	1	1975	3¾x5½	35x5†	35x5†	W
Vim, 22	2	3150	3¾x5½	36x4	36x6	W
Vim, 23	3	3950	4¼x5½	36x5	36x5d	W
Vulcan, 25	2½	4000	4¼x6	36x4	36x8	W
Vulcan, 25P	3	4500	4¼x6	36x6	40x8	W
Walker-JohnsonA	1½-2	2750	3¾x5	34x5	38x7	W
Walker-Johnson,B	3	3500	4¼x5½	36x4	36x8	W
Walter, S	5	4850	4½x6¼	36x6	40x6d	W
Ward-LaF., 2B	2½	3590	4¾x5¾	36x4	36x7	W

*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl. Trac., Tractor. **Canadian made.

Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear. *Tires—optional. †Pneumatic Tires. All others solid. ††Price includes body. §—Price includes several items of equipment.

1—Kelly-Springfield. 2—Nelson, Le Moon. 3—Twin City Four Wheel Drive.

Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive
Ward-LaF., 4A	3½	$4600	4½x6¼	36x5	36x5d	W
Ward-LaF., 5A	5	5590	5 x6¼	36x6	40x6d	W
Watson, E	1	1785	3¾x5¼	35x5†	35x5†	W
Watson, N	3½	3825	4½x5½	36x5	36x10	W
Western, W1½	1½	2550	4½x5¼	36x3½*	36x5*	W
Western, L1½	1½	2550	3¾x5	36x3½*	36x5*	W
Western, W2½	2½	3250	4½x5¼	36x4	36x7	W
Western, L2½	2½	3250	4¼x6	36x4	36x7	W
Western, W3½	3½	4250	4½x6	36x5	40x5d	W
White, 15	¾	2400	3¾x5½	34x5†	34x5†	B
White, 20	2	3250	3¾x5¼	36x4*	36x7	D
White, 40	3½	4200	3¾x5¼	36x5	40x5d	D
White, 45	5	4500	4¼x5¾	36x6	40x6d	D
White Hick., E	1	1225	3¼x5	34x5†	34x5†	W
White Hick., H	1½	1375	3¾x5	36x3½	36x5	W
White Hick., K	2½	1675	4¼x5¼	36x4	36x5	W
Wichita, K	1	2300	3¾x5¼	36x3*	36x4*	W
Wichita, L	1½	2690	3¾x5¼	36x3½*	36x5*	W
Wichita, M	2	2800	3¾x5¼	36x3½*	36x6*	W
Wichita, R	2½	3000	3¾x5¼	36x4*	36x7*	W
Wichita, RX	2½	$3600	4¼x6	36x4*	36x8*	W
Wichita, O	3½	4000	4¼x6	36x5*	36x5d*	W
Wichita, S	5	5000	4½x6	36x6	40x6d	W
Wilcox, AA	1	1900	3¾x5½	36x4*	36x4*	W
Wilcox, BB	1½	2550	4¼x5	36x4	36x5	W
Wilcox, D	2½	3000	4¼x5	36x4*	36x3½d*	W
Wilcox, E	3½	3950	4½x6	36x5*	36x5d*	W
Wilcox, F	5	4350	4¾x6½	36x5	40x6d	W
Wilson, F	1½	2270	3¾x5	36x3½	36x5	W
Wilson, EA	2½	2825	4½x5¼	36x4	36x7	W
Wilson, G	3½	3685	4½x5½	36x5	36x5d	W
Wilson, H	5	4520	4¾x6	36x6	40x6d	W
Winther, 751	1	$1795	3½x5	34x4½†	35x5†	I
Winther, 430	1½	2850	3¾x5	32x4	32x4	I
Winther, 39	1½	2450	3¾x5	34x3½	34x5	I
Winther, 49	2	3250	4 x5	34x4	34x4d	I
Winther, 50	2½	3995	4 x6	38x7†	42x9†	I
Winther, 70	3½	4200	4 x6	36x5	36x5d	I
Winther, 450	2½	3690	4 x5	34x5	36x6	I
Winther, 109	5	5250	4½x6	36x6	40x5d	I
Winther, 140	7	5900	5 x6	36x6	40x7d	I
Wisconsin, B	1	1950	4 x5¾	34x5†	34x5†	W
Wisconsin, C	1½	2500	4⅝x5¾	36x6†	36x6†	W
Wisconsin, D	2½	3500	4½x6¼	36x6	36x10	W
Wisconsin, E	3½	4900	5 x6¼	36x6†	36x12†	W
Witt-Will, N	1½	2750	3¾x5	36x3½*	36x5*	W
Witt-Will, P	2½	3250	4½x5¼	36x3½*	36x7*	W
Wolverine, J	1	2125	3½x5	34x3	34x4	I
Wolverine, J	1½	2375	3¾x5	34x3½	34x5	I
Wolverine, J	2	2640	3¾x5	34x4	34x7	I
Wolverine, J	2½	3425	4½x5¼	36x5	36x10	I
Wolverine, L	3½	4100	4½x5½	36x5	36x10	I

*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl. Trac., Tractor. **Canadian made.

Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear. "Tires—optional. †Pneumatic Tires. All others solid. ††Price includes body. §—Price includes several items of equipment.

Farm Tractor Specifications and Prices

TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Plow Capacity
All-In One	16-30	$1975	3	Clim.	4-5 x6½	GDK	3-4
Allis-Chalm. B	6-12	925	2	LeR.	4-3½x4½	Gas.	1
Allis-Chal.G.P	6-12	795	2	LeR.	4-3½x4½	Gas.	1-2
Allis-Chalm.	12-20	1350	2	Midw.	4-4½x5¼	Gas.	2-3
Allis-Chalm.	18-30	2150	4	Own	4-4¾x6½x	GorK	3-4
Allis-Chalm.	10-18	875	4	Own	4-4¾x6½	G,K	4
Allis-Chalm.	14-28	1775	4	Own	4-4¾x6	GorK	3
Allwork 2-G	14-28	1525	4	Own	4-5 x6	GorK	4
Allwork C	14-28	2500	4	Clim.	4-5 x6½	GorK	4
Andrews Kin. D	18-36	2500	4	Own	4-5 x6½	G,K	4-5
Appleton	12-20	1500	4	Buda	4-4½x5½	G,K	2-3
ARO. 1921-22	3-5	495	4	Own	1-4½x5	Gas.	1
Aultman-T.	15-30	2200	4	Clim.	4-5 x6½	G,K	4
Aultman-T.	22-45	3420	4	Own	4-5½x8	G,K	6
Aultman-T.	30-60	4500	4	Own	4-7 x9	G,K,D	8
Automot, B-3	12-24	1785	4	Herc.	4-4 x5	Gas.	2-3
Avery, SR.Cul	5-10	....	4	Own	4-3 x4	G,K	..
Avery Cult-C	....	....	3	Own	6-3 x4	G,K	2
Avery B	5-10	....	4	Own	4-3 x4	G,K	..
Avery C	....	....	4	Own	6-3 x4	G,K,D	2-3
Avery	8-16	....	4	Own	2-5½x6	G,K,D	2-3
Avery	12-20	....	4	Own	4-4¾x6	G,K,D	3-4
Avery	12-25	....	4	Own	2-6½x7	G,K,D	3-4
Avery	14-28	....	4	Own	4-4½x7	G,K,D	3-4
Avery	18-36	....	4	Own	4-5½x6	G,K,D	4-5
Avery	25-50	....	4	Own	4-6½x7	G,K,D	5-6
Avery	45-65	....	4	Own	4-7¾x8	G,K,D	8-10
Bates	15-25	....	4	Own	4-4¼x6	Ker.	3
Bates Mule. H	15-25	....	4	Midw	4-4½x5¼	Gas.	3
Bates Mule, F	18-25	....	*2	Midw	4-4½x5¼	Gas.	3
Bates Mule, G	25-35	....	*2	Midw	4-4½x6	Gas.	com.
Beeman, G	2-4	315	4	Own	1-3½x4½	Gas.	..
Best	30	3100	*2	Own	4-4¾x6½	G,K,D	4
Best	60	5450	*2	Own	4-6½x8½	G,K,D	8-9
Boring 1921	....	1850	3	Wauk	4-4¾x5¼	GorK	2
Burn-Oil, 1922	15-30	1495	4	Own	2-6¾x7	Ker.	3-4
Capital	15-39	1000	2	Own	4-4¼x6	Gas.	3
Case	10-18	800	4	Own	4-3 x5	GorK	2
Case	15-27	1680	4	Own	4-4½x6	GorK	3
Case	22-40	3100	4	Own	4-5½x6¾	GorK	4-5
Caterpillar T11	25	3975	*2	Own	4-4¾x6	Gas.	4
Caterpillar T16	40	6050	*2	Own	4-6½x7	Gas.	6
Centaur	5-2½	385	2	N Way	2-4½x4½	GorK	1
Chase	12-25	1725	3	Buda	4-4¼x5½	GorK	2-3
Chicago 40	40	2500	4	Own	4-4½x6	Gas.	4
Cletrac F	9-16	845	*2	Own	4-3¼x4½	G,K,D	2
Cletrac W	12-20	1495	*2	Own	4-4 x5½	G,K,D	2-3
Dakota 4	15-27	1500	3	Dom,	4-4¾x6	Gas.	3
Dart B.J.	15-30	1800	4	Buda	4-4½x6	Gas.	3-4
Depue A	20-30	2500	4	Buda	4-4½x6	Gas.	4
Dill D	20	2380	4	Cont.	4-4½x5½	Gas.	3
Dill R.W.	20	2980	4	Midw.	4-4½x6	Gas.	3
Do-It-All A	3-6	595	..	Own	1-4½x5	Gas.	1
Eagle F	12-22	....	4	Own	2-7 x8	GorK	3-4
Eagle F	16-36	....	4	Own	2-8 x8	GorK	4-5
E-B AA	12-20	1445	4	Own	4-4¾x5	G,K,D	3
E-B Q	12-26	925	4	Own	4-4¾x5	G,K,D	3
E-B	16-32	2080	4	Own	4-5¼x7	G,K,D	4
Evans	18-30	2000	4	Buda	4-4½x6	G,K	3
Fageol D	9-12	1525	4	Lyc.	4-3½x5	Gas.	2
Farm Horse. B	18-30	1885	4	Clim.	4-5 x6½	G,K	3-4
Farquhar	15-25	....	4	Buda	4-4½x6	G,K,D	3-4
Farquhar	18-35	....	4	Own	4-6 x8	G,K,D	4-5
Farquhar	25-50	....	4	Own	4-7 x8	G,K,D	6-7
Fitch 4	20-35	....	4	Clim.	4-5 x6½	GorK	3-4
Flour City	20-35	....	4	Own	4-5¼x6	Ker.	4-6
Flour City	30-50	....	4	Own	4-6¾x7	Ker.	6-8
Flour City	40-70	....	4	Own	4-7½x9	Ker.	8-10
Fordson	....	625	4	Own	4-4x5	G,K	2
Fox E	20-40	3100	4	Own	4-5½x7½	G or K	4
Franklin G	18-30	4000	*2	Clim.	4-5 x6½	G or K	3-4
Franklin C	18-30	3350	*2	Clim.	4-5 x6½	G or K	3-4
Franklin G2	18-30	4350	2	Clim.	4-5 x6½	G or K	3-4
Frick A	12-20	....	4	Erd.	4-4 x6	G,K	2-3
Frick C	15-28	....	4	Beav.	4-4½x6	G,K	3-4
Grain Belt. A	18-36	$2150	4	Wauk.	4-4¾x6¾	G or K	4
Gray 1920	18-36	2000	3	Wauk	4-4¾x6¾	Gas.	4
Ground Hog	19-31	2000	4	Erd.	4-4 x6	G or K	3
Gt. Western St	20-30	1950	4	Beav.	4-4¾x6	K	4
Hart-Parr 20	20	945	4	Own	2-5¼x6½	K,D.	2
Hart-Parr 30	30	1295	4	Own	2-6½x7	K,D.	2
Heider D	9-16	1170	4	Wauk	4-4¼x5¾	G,K	2
Heider C	12-20	1395	4	Wauk	4-4½x6¾	G,K	3
Heider Cult	6-10	1050	4	LeR.	4-3½x4½	Gas.	2-3
Hicks	20-30	....	4	....	4-4½x6	K or G	4
Huber Light 4	12-25	1185	4	Wauk	4-4½x5¾	G or K	3
Huber Super 4	15-30	1885	4	Midw.	4-4½x6	Gas	3
Illinois, Super-Drive C	18-30	....	4	Clim.	4-5 x6½	G,K	4
Imperial E	40-70	4500	4	Own	4-7½x9	G,K,D	10
Indiana F	5-10	895	2	LeR.	4-3½x4½	Gas.	1-2
International	8-16	900	4	Own	4-4¼x5	G,K,D	2
International	15-30	1750	4	Own	-5¼x8	G,K,D	4
J-T N	20-40	....	*2	Chief.	4-4¾x6	G,K,D	3-4
Klumb F	16-32	1475	4	Clim.	4-5 x6½	....	..
Knudson 1920	25-45	2500	4	Own	4-5 x9	Gas	4-6
LaCrosse M	6-12	650	4	Own	2-4 x6	G,K	1
LaCrosse G	12-24	985	4	Own	2-6 x7	G or K	3
Lauson 5	12-25	1495	4	Midw.	4-4½x5¼	Gas.	3
Lauson 20	15-25	1685	4	Beav.	4-4½x6	G or K	3-4
Lauson 21	15-30	1985	4	Beav.	4-4¾x6	G or K	3-4
Lauson Road	15-30	2225	4	Beav.	4-4¾x6	K	..
Leader B	12-18	1095	4	Own	2-6 x6¼	G,K,D	2-3
Leader N	16-32	1985	4	Clim.	4-5 x6½	G,K	3-4
Leader GU	18-35	2775	*2	Clim.	4-5 x6½	G,K	3-4
Leonard E	20-30	2530	4	Buda	4-4½x6	G,K	3
Linn H4J	40-	4500	*	Cont.	4-4¾x5½	Gas	4
Linn W	60	5100	*	Wauk	4-5 x6¼	Gas	6
Little Giant, B	16-22	2200	4	Own	4-4½x5	K	4
Little Giant, A	26-35	3300	4	Own	4-5½x6	K	6
Lombard 1921	35-150	....	*2	....	6-5½x6¾	Gas.	16
Lombard 1921	50	....	*2	....	4-4¾x6½	....	6-10
Magnet 8	14-28	1875	4	Wauk	4-4½x6¼	K&G	3
Master Jr.	5-10	585	..	LeR.	-2¾x4	Gas.	1
MerryGar 1921	2	230	2	Evin	1-2⅝x2½	Gas.	..
Minne. All-P	12-25	900	4	Own	4-4½x7	G or K	3
Minne. Gen.P	17-30	1675	4	Own	4-4¾x7	G or K	3-4
Minne. Med.Duty	22-44	3000	4	Own	4-6 x7	G or K	5-6
Minne. HeavyDuty	35-70	4150	4	Own	4-7½x9	G or K	8-9
Mohawk 1921	8-16	785	2	Light	4-3¼x4½	K or G	1-2
Moline Univ D	9-18	990	2	Own	4-3½x5	Gas.	2-3
Moline Orch.	9-18	1075	2	Own	4-3½x5	Gas.	2-3
Motor Macult	1½	195	2	Own	1-2¾x3½	Gas.	..
Motox	15-30	2250	4	Buda	4-4½x6	Gas.	3-4
NB 1	3-6	425	4	Own	2-3¾x4	Gas.	1
Nichols-Shep. 23-42	20-42	3100	4	Own	8 x10	G or K	3-6
Nichols Shep. 25-50	25-50	3460	4	Own	9 x12	G or K	4-7
Nilson Senior	20-40	2475	5	Wauk	4-5 x6¼	G,K	4
Oil Pull K	12-20	1485	4	Own	2-6 x8	K,D	3
Oil Pull H	16-30	2285	4	Own	2-7 x8½	K,D	4
Oil Pull G	20-40	3175	4	Own	2-8 x10	K,D	5-6
Oil Pull E	30-60	4590	4	Own	2-10x12	K,D	8-10
Oldsmar GarK	2½-5	395	4	Own	1-5½x5½	Gas.	1
Oliver A	15-30	....	*2	Beav.	4-4½x6	G or K	3-4
Once Over Tiller Mark 6	12-25	3000	4	Strns	4-4½x6	Gas.	2
Parrett K	15-30	1950	4	Pitt	4-4½x6	G,K	3
Peoria L	12-25	1600	4	Clim.	4-5 x6½	G,K	3
Pioneer G	18-36	....	4	Own	4-5½x6	G,K,D	4
Pioneer C	30-60	....	4	Own	4-7 x8	Gas.	10
Plowman A	15-30	1695	4	Buda	4-4½x6	G,K	3-4
Port Huron A	12-25	$1500	4	Chief	4-3¾x6	G,K	3
Ranger Cul. T-20	8-16	....	4	LeR.	4-3½x4½	Gas.	1
Reed A	15-30	1985	4	Wauk	4-4½x6½	G or K	3-4
Reed A-1	18-36	2185	4	Wauk	4-5 x6¼	Gas.	4
Reliable	10-20	885	4	Own	2-6 x7	Ker.	2
Rex	12-25	1600	4	Wauk	4-4¼x5¾	G or K	3
Russell	12-24	1500	4	Own	4-4¼x5¾	G or K	2-3
Russell	15-30	2200	4	Own	4-5 x6½	G or K	3-4
Russell	20-35	3000	4	Own	4-5½x7	G or K	4-5
Russell	30-60	5000	4	Own	4-8 x10	G or K	8-10
Samson M	....	....	4	Nor	4-4 x5½	G,K	2
Sandusky, J	10-20	1250	4	Own	4-4¼x5¼	G,K,D	2
Sandusky E	15-35	1750	4	Own	4-5 x6½	G,K,D	4
Shawnee Com.	6-12	....	2	LeR.	4-3½x4½	Gas.	1
Shawnee Com.	9-18	....	2	Gray	4-3½x5	....	..
Shelby D	15-30	....	4	Beav.	4-4¾x6	G,K	3
Shelby C	10-20	....	4	Erd.	4-4 x6	G or K	2-3
Short Turn	20-40	1500	3	Beav.	4-4¾x6	G,K	3
Steady Pull	12-24	1485	4	Own	4-4 x5	Gas.	3
Stinson 4E	18-36	1835	4	Beav.	4-4¾x6	G,K	4
Stone	20-40	2250	4	Beav.	4-4¾x6	G,K	4
Tioga 3	15-27	2625	4	Wisc.	4-4½x6	Gas.	3-4
Titan	10-20	900	4	Own	2-6½x8	G,K,D	3
Topp B	30-45	3500	4	Wauk	4-4¾x6¾	Gas.	3-4
Toro Cultivator	6-10	....	3	LeR.	4-3½x4½	Gas.	2
Townsend	10-20	895	2	Own	4-6½x7	Ker.	2-3
Townsend	15-30	1485	2	Own	4-7 x8	Ker.	3-4
Townsend	25-50	2750	2	Own	4-8½x10	Ker.	4-8
Traction Motor	40-50	....	4	....	8-3¼x5	Gas.	4-5
Traylor TB	6-12	715	4	LeR.	4-3½x4½	Gas.	1-2
Triumph H	18-36	2450	2	Erd.	4-4¾x6	Ker.	4
Trundaar 19	25-40	3750	*2	Wauk	4-5 x6¼	G or K	4
Turner 1921	14-25	1295	4	Buda	4-4¼x5½	G,K	3
Twin City	12-20	1580	4	Own	4-4¼x6	G,K	3
Twin City	20-35	3175	4	Own	4-5½x6¾	G,K	5
Twin City	40-65	5250	4	Own	4-7¾x9	G,K	8
Uncle Sam C20	12-20	1385	4	Weid.	4-4 x5½	G	2-3
Uncle Sam B19	20-30	2300	4	Beav.	4-4¾x6	G or K	3-4
Uncle Sam D21	20-30	1985	4	Beav.	4-4¾x6	G or K	3-4
Universal	1-4	475	2	Own	1-3½x5	G	1
Utilitor 501	2¼-4	389	4	Own	1-3½x4½	G	1
Victory 1921	9-18	1350	4	Gray	4-3½x5	Gas.	2
Victory 1921	15-30	1750	4	Wauk	4-4¼x5¾	Gas.	3
Vim B	15-30	1650	4	Wauk	4-4¾x5¾	G,K	3
Wallis K	15-25	1600	4	Own	4-4¼x5¾	G,K	3
Waterloo N	12-25	1450	4	Own	2-6½x7	G,K	3
Webfoot 53	28-53	5000	*2	Wisc.	4-5¾x7	G,D	6
Wellington B	12-22	....	4	Erd	4-4 x6	Ker.	2-3
Wellington F	16-30	....	4	Chief	4-4¾x6	Ker.	3-4
Western, 1920	16-32	2100	4	Clim.	4-5 x6½	Gas.	4
Wetmore 21-22	12-25	1585	4	Wauk	4-4 x5¾	G,K	3
Wharton W-E	12-20	1800	3	Buda	4-4½x5½	Gas.	2
Whitney B	9-18	595	4	Own	2-5½x6½	Gas.	2
Wichita T	15-30	2000	4	Beav.	4-4½x6	G,K,D	3-4
Wisconsin E	16-30	2250	4	Clim.	4-5 x6½	G or K	3
Wisconsin F	20-40	2450	4	Wauk	4-5 x6¼	G or K	4
Wisconsin, H	22-40	3200	4	Clim.	4-5½x7	G or K	4-6
Yuba 12-20	12-20	2600	*2	Wisc.	4-4½x6¾	G,K,D	3
Yuba 13-25	15-25	3100	*2	Wisc.	4-4¼x6	G,K,D	..
Yuba 23-35	20-35	4185	*2	Wisc.	4-5¾x7	G,K,D	4
Yuba 25-40	25-40	4650	*2	Wisc.	4-5¾x7	G,K,D	..
Zelle	12-25	....	4	....	4-4¼x5½	G or K	3

ABBREVIATIONS: G—Gasoline. K—Kerosene. D—Distillate. Plow capacity varies in relation to operating conditions. Figures are based on 14 in. plows. Engine Make: Beav.—Beaver. Clim.—Climax. Cont.—Continental. Dom.—Domas. Evin.—Evinrude. Herc.—Hercules. LeR.—LeRoy. Midw.—Midwest. Nway.—New Way. Nor.—Northway. Strns.—Stearns. T.C.—Twin City. Wauk.—Waukesha. Weid.—Weidely. Wis.—Wisconsin. *—Crawler type. All others are wheel type.

COMING MOTOR EVENTS

AUTOMOBILE SHOWS

Aurora, Ill.	Automobile	Jan. 1- 7
New York	National Automobile	Jan. 7-14
New York	National Body Builders'	Jan. 9-14
Buffalo	Buffalo Automobile Dealers' Assn.	Jan. 14-21
Philadelphia	Automobile	Jan. 14-22
Rochester	Automobile	Jan. 16-21
Tulsa, Okla.	Automobile	Jan. 16-21
Oakland, Calif.	Automobile	Jan. 16-22
Pontiac	Pontiac Automobile Dealers' Assn.	Jan. 18-21
Milwaukee	Fourteenth Annual Automobile	Jan. 19-25
San Francisco	Automotive Equipment Exposition	Jan. 21-27
Detroit	Automobile Show	Jan. 21-28
Cleveland	Cleveland Mfrs.-Dealers' Assn.	Jan. 21-28
Baltimore	Annual Automobile	Jan. 21-28
Portland, Ore.	Annual Automobile	Jan. 23-29
Montgomery, Ala.	Alabama Automobile Dealers' Assn.	Jan. 23
Binghamton, N. Y.	Binghamton Dealers' Assn.	Jan. 23-28
Toledo	Automobile	Jan. 23-28
Allentown, Pa.	Lehigh Automobile Trade Assn.	Jan. 28-Feb. 4
York, Pa.	York County Dealers' Assn.	Jan. 28-Feb. 4
Chicago	National Automobile	Jan. 28-Feb. 4
Chicago	Automobile Salon	Jan. 28-Feb. 4
Hudson, N. Y.	Second Annual Show	Jan. 30-Feb. 4
Erie, Pa.	Automobile	Jan. 30-Feb. 4
Scranton, Pa.	Annual Automobile	Jan. 30-Feb. 4
Lancaster, Pa.	Automobile Trade Assn.	Feb. 1- 4
Columbus	Columbus Automobile Dealers' Assn.	Feb. 2- 8
Tampa, Fla.	South Florida Fair Assn.	Feb. 2-14
Troy, N. Y.	Eighth Annual Used Car	Feb. 4-11
Youngstown	Youngstown Dealers' Assn.	Feb. 4-11
Scranton, Pa.	Annual Motor Truck	Feb. 6- 9
London, Ont.	Nat'l Motor Show of West Canada	Feb. 6-11
Minneapolis	Tractor	Feb. 6-11
Minneapolis	Automobile	Feb. 6-11
Winnipeg, Can.	Canadian Equipment Assn.	Feb. 6-11
Schenectady	Schenectady Dealers' Assn.	Feb. 6-11
Flint, Mich.	Michigan Automotive Trade Assn.	Feb. 8-11
Kansas City	Kansas City Motor Dealers' Assn.	Feb. 11-18
Atlanta	Southern Automobile	Feb. 11-18
San Francisco	Sixth Annual Pacific Automobile	Feb. 11-18
Huntington, W.Va.	Third Annual Show	Feb. 13-18
Kalamazoo, Mich.	Michigan Automotive Trade Assn.	Feb. 14-18
Albany	Automobile Dealers' Assn.	Feb. 18-25
Hartford, Conn.	Hartford Automobile Dealers' Assn.	Feb. 18-25
Duluth	Automobile Show	Feb. 20
Bethlehem, Pa.	Automobile and Accessory Show	Feb. 20-25
Louisville, Ky.	Fourteenth Annual Automobile	Feb. 20-25
Syracuse	Fourteenth Annual Automobile	Feb. 20-25
Gr. Rapids, Mich.	Michigan Automotive Trade Assn.	Feb. 20-25
Deadwood, S. D.	Deadwood Business Club	Feb. 21-25
Trenton, N. J.	Car, Truck and Accessory	Feb. 22-25
Montreal	Automobile	Feb. 25-Mar. 1
Des Moines	Winter Automobile	Feb. 26-Mar. 3
Amsterdam, N. Y.	Third Annual Show	Feb. 27-Mar. 4
Bethlehem, Pa.	Truck and Tractor Show	Feb. 27-28
Elmira, N. Y.	Elmira Automobile Club	Feb. 27-Mar. 4
Muskegon, Mich.	Michigan Automotive Trade Assn.	Feb. 27-Mar. 4
Portland, Ore.	Portland Dealers' Assn.	Feb. 27-Mar. 4
Springfield, Mass.	Seventh Annual Automobile	Feb. 27-Mar. 4
Bay City, Mich.	Bay City Dealers' Assn.	Feb. 28-Mar. 4
Wichita, Kan.	Wichita Motor Trade Assn.	Feb. 28-Mar. 4
Ardmore, Okla.	Ardmore Automobile Dealers' Assn.	March
Galesburg, Ill.	Galesburg Automotive Dealers' Assn.	March
Madison, Wis.	Four Lakes Bldg.	March
San Antonio	Automobile Trades Assn.	March
St. Louis	Manufacturers' and Dealers' Assn.	March
Brooklyn	Eleventh Annual	Mar. 4-11
Saginaw, Mich.	Michigan Automotive Trade Assn.	Mar. 6-10
Indianapolis	Annual Automobile	Mar. 6-11
Nashville	Nashville Automobile Trades Assn.	Mar. 6-11
Wilmington, Del.	Wilmington Trade Assn.	Mar. 6-13
Denver	Denver Automobile Trade Assn.	Mar. 10-20
Boston	Annual Automobile	Mar. 11-18
Newark, N. J.	Newark Automobile Dealers' Assn.	Mar. 11-18
Boston	Automobile Salon	March. 13-18
Omaha	Omaha Automobile Trade Assn.	Mar. 13-18
Port Huron, Mich.	Michigan Automotive Trade Assn.	Mar. 15-18
Ypsilanti, Mich.	Michigan Automotive Trade Assn.	Feb. 1-4
Oklahoma City	Sixth Annual Show	Mar. 27-Apr. 1
Ben. Harb., Mich.	Michigan Automotive Trade Assn.	Mar. 28-31
Buffalo	Second Annual Show	April
Bat. Creek, Mich.	Michigan Automotive Trade Assn.	April 2- 8
Hartford, Conn.	Automobile Show	Sept. 4-9

FOREIGN SHOWS

London, Eng.	Automobile Show	Feb. 6-11
Santiago, Cuba	Annual Automobile	March, 1922
Rio de Janeiro	Automotive Exhibition	September, 1922

CONVENTIONS

Chicago	Am. Road Builders' Conv. and Show	Jan. 17-20
Montgomery, Ala.	Ala. Dealers' Assn. Annual Meeting	Jan. 23
Chicago	Fifth Annual N. A. D. A. Convention	Jan. 30-31
Chicago	Auto. Elec. Assn. Annual Meet.	Jan. 31-Feb. 2

McQUAY-NORRIS ENLARGES

St. Louis, Dec. 31—The McQuay-Norris Mfg. Co., of this city, manufacturer of piston rings, announces that it has acquired the plant and business of the Wainwright Engineering Corp., of Connersville, Ind., which manufactures Wainwright pistons and pins. The business will be continued in Connersville under the name of the McQuay-Norris Mfg. Co. of Indiana. Plans are already under way for plant changes and additions to increase the output.

Harry A. Wainwright, who has been the active head of the Wainwright Corp., will become treasurer and general manager of the new Indiana company, and will continue as general manager of the Connersville plant. Paul J. Barnard, vice-president and sales manager of the Wainwright company, will be secretary of the new company. Sales will be taken over by the McQuay-Norris Mfg. Co., which has 15 branch offices and 35 field representatives

BODY BUILDERS' PRIZES

New York, Dec. 30—In addition to the display of passenger car bodies which will be seen at the body builders' exposition, to be held in the Twelfth Regiment Armory Jan. 9 to 14, there will be a full line for commercial vehicles, including dumping bodies, light and heavy panel bodies and omnibus bodies. The management of the show has appropriated $500 for cash prizes for the best body design. More than 40 of the leading designers already have entered the contest.

The contest is open only to individuals. The design must illustrate a complete car with a body which will accommodate four or more passengers. The awards will be based on the merit of the design itself, its fitness for the chassis and its practicability. The body must fit some one of the chassis used in substantial quantities by any automobile manufacturer. The chairman of the committee on awards is William Brewster, of Brewster & Co.

DEALERS CROWD MILWAUKEE SHOW

Milwaukee, Wis., Jan. 2—Sixty-two distributors and dealers in passenger cars, 22 truck concerns, and 36 automotive equipment dealers have been granted exhibit space at the fourteenth annual Milwaukee show, to be held in the Auditorium, Jan. 19 to 25, under the auspices of the Milwaukee Automotive Dealers' Assn. This is by far the largest number of exhibitors that has ever entered the Milwaukee annual winter show. The pressure upon passenger car display space is so heavy that a dozen dealers have been obliged to accept room in Machinery Hall, in the basement of the Auditorium.

ATHENS COUNTY PRIZE WINNER

Columbus, O., Jan. 2—The Athens County Automotive Trade Assn. won the first prize of $250 offered by the Ohio Automotive Trade Assn. for the best attendance at its recent fifth annual convention here.